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Skeptical Inquirer

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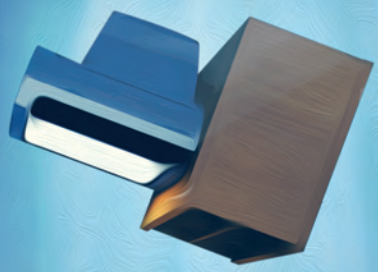

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[FROM THE EDITOR

Our Generation's UFO 'Flap'

Every generation, it seems, must have its own UFO "flap." ("That's the technical term," I once heard Carl Sagan wryly observe.) We had flaps in the 1950s, 1970s, and 1990s (the SI anthology *The UFO Invasion: The Roswell Incident, Alien Abductions, and Government Coverups,* Prometheus Books, 1997, chronicled our coverage of that one). After a lull, now we've been in the midst of another, mostly manufactured mystery pushed by UFO enthusiasts. They even got a Pentagon report, issued June 25 by the Office of the Director of National Intelligence. But for them, what a disappointment it must have been. Only nine pages. No case studies. No details. Unidentified blips in the sky, but not one word—not one, nothing!—about aliens or extraterrestrials.

Author Guy Harrison begins our special "UFOs in the News" feature section with an insightful overview, "How to Keep Your Brain on Solid Ground During this Latest UFO Excitement." Veteran UFO skeptic and longtime SI contributor Robert Sheaffer contributes two articles. The first critiques *The New Yorker*'s disappointingly naive fifteen-page article that helped fuel the public excitement. The second details other credulous media coverage. Investigator and writer Mick West, whose proposed explanations for at least four of the most widely seen Navy UFO videos helped keep things in needed perspective, starts a new SI column, "The Practical Skeptic," with his analysis showing how almost all UFO beliefs contain an element of conspiracy thinking. Amid all this, our Committee for Skeptical Inquiry issued a statement to media, prepared by several fellows, urging greater caution in reporting on UFO claims and offering nine constructive tips. We publish the complete statement. It has been a fun ride, this 2021 flap—if a bit frustrating for we science-minded skeptics to see this all happening again. But, in the end, perhaps it's been a sobering lesson for the wider public.

* * *

We have an intriguing mix in our three other feature articles. Philosophy professor Sven Ove Hansson of Sweden's Royal Institute of Technology documents how postmodernists and social constructivists in academia, most of them sociologists, have promoted pseudoscience and science denial. Physicist Taner Edis follows with a thoughtful plea that skepticism needs more historians and social scientists, to provide broader perspective. And, as if we heard him, that is followed by a report by Ted Goertzel, a professor emeritus of sociology at Rutgers, "'I Was Wrong': Religious Prophecy and the 2020 Election." Are the Hansson and Edis articles in conflict, or do they complement each other? You can decide. Overall, I think they are both right. The postmodernist movement in academia, strongest in the 1990s but still active today, has damaged the public's perception of science. When you hear people claiming science is just constructed opinion, you hear its echoes. At the same time, historians and social scientists who actually understand and appreciate science can bring valuable critical perspectives to a whole range of topics of interest to science-minded skeptics. I think skeptical inquiry, and science overall, are strengthened and broadened when *that* happens.

—Kendrick Frazier

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Geocentric in Ghana: An Antiscience Lawsuit

Glenn Branch

A lawsuit recently filed in the Supreme Court of Ghana seeks to ban the teaching in the Ghanaian public schools not only of evolution but also of the idea that Earth is in motion. Filed on November 24, 2020, the lawsuit apparently received no public attention until March 20, 2021, when Emmanuel Ebo Hawkson covered it for *The Mirror*, provoking a spate of derivative stories in the Ghanaian press. But a perusal of the filings (kindly provided by Hawkson) reveals a profusion of fascinating details absent in the press coverage.

The plaintiff is Johnson Anane (or "Sir" Johnson Anane, as he styles himself in his motion), a lecturer in the Department of Wood Technology—which apparently specializes in carpentry, joinery, and furniture design and construction—at Sunyani Technical University. He is listed on the university's website as having a bachelor of science degree in wood technology and management. The respondents are the director-general of the Ghana Education Service, the president of the Ghana Science Association, and (nominally) the attorney general of Ghana.

American readers will be surprised to learn from Anane's motion that "in the United States of America, five states have placed a ban on the teaching of evolution theory in their schools as [of] 2012." There were not in 2012—nor are there now—any such bans; the U.S. Supreme Court ruled that the Scopes-era bans on the teaching of evolution were unconstitutional in *Epperson v. Arkansas* (1968). Ironically, on that same page of the motion, Anane complains about "the current status quo [in Ghana] of accepting whatever is being brought from the foreign world."

Yet of the sixty numbered paragraphs in Anane's motion, only three focus on evolution. His main target is instead the motion of Earth, including both rotation about its axis and revolution around the Sun, and its use in explaining phenomena such as the alternation of day and night and the succession of the seasons. Although evolution and the motion of Earth are taught in Ghana's public schools, Anane writes that "these theories … [are] totally false, unproven by science and a total affront to the educational wellbeing of the Ghanaian students and [need] to be abolished or prohibited."

Anane's pseudoscientific views are not confined to creationism and geocentrism; he is apparently also a flat-earther. While criticizing classroom models of the alternation of day and night with a flashlight representing the Sun and a globe representing Earth, he insists, "According to the [B]ible, Isaiah 40:22, the earth or the world is circular. The scientific representation of the earth as a globe (curved or raised) is wrong and absurd." Nevertheless, he seems not to be explicitly asking for a ban on teaching that Earth is spherical.

The bulk of the evidence Anane adduces against the motion of Earth and evolution is scriptural in nature: his motion teems with chapter-and-verse references to the Bible, although he ecumenically refers to the Qur'an once and the Bhagavad-Gita twice. A few sophistical arguments are also offered: for example, Anane quotes one dictionary as defining a planet as "a very round object in space" and another as defining space as the "region beyond the earth['s] atmosphere," triumphantly concluding that Earth is not a planet. Conspicuously lacking is any reference to scientific evidence.

Instead, Anane assumes that the burden of proof is on the respondents. He repeatedly asks the court to ban the teaching of the motion of Earth and evolution if the respondents fail to provide proof of them, offers lists of questions that the court should ask of the respondents (e.g., the provenance of "false scientific measurements about the solar system," such as the time it takes Earth to revolve around the sun), and even fantasizes, Walter Mitty–like, about the court compelling the respondents to testify on a live telecast for the general public.

Such demands are not new for Anane. In 2009, protesting that "the perfect will of God concerning creation has been despised by scientists," he challenged what was then the International Council of Scientific Unions (now the International Science Council) to defend the motion of Earth and evolution, according to the *Daily Guide*. Similarly, he complains in his motion that the minister of education failed to attend a conference on the theme of "Revisitation of some scientific discoveries in the light of scripture," which he organized in 2012, and refused to meet with him afterward.

In the wake of his 2012 conference, Anane filed a lawsuit in the High Court of Kumasi in 2013 asking for the cessation of teaching and testing on material about the motion of Earth on the grounds that it is "entirely false and unproven by science." The case was eventually dismissed in 2020. In a ruling included in the Supreme Court filings, the court observed that "the plaintiff … seeks no personal right to be enforced on his behalf and so the High Court has no jurisdiction in this matter" and advised Anane to pursue his case in the Supreme Court, which would have appropriate jurisdiction.

In his subsequent motion before the Supreme Court, Anane accordingly alleges that the teaching of the motion of Earth and of evolution infringes his "fundamental human rights and freedoms as a concerned Christian" as well as the educational rights of Ghana's public school students under the Ghanaian constitution. However, his understanding of Ghanaian constitutional law is questionable; a December 2020 filing from the office of the Attorney General tersely described Anane's motion as "without merit and an abuse of the court's process," asking for it to be dismissed.

Glenn Branch is deputy director of the National Center for Science Education. He received the Evolution Education award for 2020 from the National Association of Biology Teachers.

Neil deGrasse Tyson on Space, Reality, Pop Culture, Skeptics, and Atheists

Kendrick Frazier

Credit: Norwegian University of Science and Technology (Wikipedia)

In a brisk seventy-five minutes, Neil deGrasse Tyson wasn't able to cover all the biggest questions about the universe, as he does in his new book *Cosmic Queries*, or scores of popular topics that intrigue the public, as he does in *Letters to an Astrophysicist*, but nevertheless he did pretty well.

In his Skeptical Inquirer Presents online conversation on May 27, watched by about 1,400 registrants and hosted by comedian Leighann Lord, the noted astrophysicist and educator was in good form. He managed to tell us why he likes the old movie *The Blob*, why *Star Wars* fails science tests, why commercial space flight disappoints him, how humor helps get his pro-science messages across, and his thoughts about the skeptical movement he is part of—and the atheist movement he is not.

Which is better? Star Wars *or* Star Trek*?* Tyson acted as though the question were a joke. "Of course, *Star Trek*," he said. That show made some attempt at scientific accuracy. *Star Wars* is a different matter. He recalled the famous bar scene in *Star Wars*, with a seeming great diversity of creatures from a variety of star systems. But they all have upright bodies, faces, noses, eyes, mouths—they're all still a lot like us. It's a failure of imagination. "Just think of the diversity of life on Earth," he said. "When you have that reality on this planet and you go to another planet," he paused, "I would expect higher creativity than what we saw in *Star Wars*."

The Blob was better in that sense, he suggests. It is a 1958 movie starring Steve McQueen. "The Blob is transparent; it can flow through vents; it turns red when it globs onto victims." That's scary, Tyson notes. "And it's a new life form."

Commercial passenger spaceflight: He didn't want to bash the current fledgling attempts to take passengers into "space," but he wanted us to have some perspective. "We are delusional—that might be harsh—but we are duped by fifty years of space access that going into space means going 200 miles above Earth's surface. That's the distance from New York to Washington, D.C."

Think about it, he said. On a standard school room globe, "It's 3/8ths of an inch." The whole system has told us that's *space*, Tyson lamented.

He doesn't even like the operational definition of space, which refers to the height (100 kilometers, or sixty-two miles) where there are so few air molecules above you that sunlight no longer scatters to illuminate the air.

"To me, space is going somewhere," he said. "If you want to go somewhere—Moon, Mars—I'm all aboard." Not literally, he quickly clarified. He wouldn't be on the first new spaceships. "I'm not a first adopter with first rockets on first missions."

Tyson lamented that textbooks can't really show the scale of even our nearby

part of the solar system. Their page size just doesn't allow it. "[At the scale of] a school room globe of Earth, the Moon is thirty feet away. Texts can't show that." On the same scale, Mars is a mile away.

Occam's Razor: At one point, host Lord interrupted to ask if Tyson would take a question. Although at first hesitant to stop their conversation, when Lord explained it came from a fourth-grade student, he agreed: "Okay, bring him on." It was a long scientific question giving the young man's complicated theory that he hoped might explain dark matter. Tyson joked that the boy's parents should "look in the basement and see what this kid is doing!"

"It's true that dark matter is probably a particle," he answered, but the rest of the complications in the suggested theory may not be necessary. "Multiplicity ought not be posited without necessity." He added with a smile, "Occam, original wording." Tyson added that he was nine, about that boy's age, when he first visited Hayden Planetarium, which he now directs. It was this visit that led to his lifelong interest in science.

Reality or simulation? Is our world real or, as some writers suggest, are we living in a simulation? Tyson gave this question a serious answer. "All evidence of science suggests it is not an illusion—that it is real, that it doesn't rely on consciousness to measure," he said. "The point is to remove the shortcoming of the human sensory situation. That's why science didn't take off till the invention of the microscope and telescope" and all the ensuing technologies to record and analyze data. "Reality has an independent existence separate from your ability to experience it."

Humor and pop culture: "On [my podcast] *StarTalk*, a fundamental element is humor," Tyson emphasized, "because people learn more when they're smiling. They are happy." He noted that he spends a lot of effort working in pop culture—for instance, cameo appearances in the movie *Sharknado 6* (yes!) and the hit TV series *The Big Bang Theory*.

"To the extent I can bring science to pop culture, that helps to bring mainstream science to the masses. . . . I realize the value of it. It is serving the greater good and greater cause of science literacy in society."

UFOs—Why are they so hot today? Tyson usually prefers to let his fellow skeptics deal with UFO questions, and this time was only a little different. "This audience is fully informed on this topic," he said. He did note that "about six billion photos" are uploaded to the internet every day, much of it high-resolution color imagery. So if alien spacecraft were really buzzing about our skies, or landing and abducting people, we should have good photos. "We have cats falling off tables; you'd think a video of an alien would be better than that."

Skepticism and atheism: Finally, given his audience this day, Tyson found himself negotiating some slightly tricky waters. At one point, host Lord commented drily, "Well, *that's* not controversial!"

It started with this question from a viewer: "Why don't you publicly label yourself as a skeptic?"

He quickly corrected the questioner. "I *do* label myself a skeptic. Oh, you mean an atheist." Tyson is one of the best-known fellows of the Committee for Skeptical Inquiry, publisher of the Skeptical Inquirer, and is also a strong supporter of the overall Center for Inquiry.

He said he maintains a small distance between himself and the skeptic's movement. "Just a little distance." He explained, "There are so many good people in the skeptic's movement. I don't need to be in the middle of that. There are so many tasks they do that I don't need to do. I can write about astrophysics."

This stance, he said, "allows space for people to shine. I don't need to get in their way." And he emphasized that the slight distance he maintains is "physical, not financial. CFI has received more of my donations than any other organization ever."

Atheism is different for him, he said. Here he maintains more distance. He says when someone asks if he's an atheist, "I generally say no," although he does fit the definition. "The dictionary definition of atheist describes me," he said. "But I also use words for a living. Words are shaped by the people who use the words. Some of the most visible atheists in the world today say things and behave in ways that I never have and never will." He said he fears that "people will think I am like them, and I am not."

He still uses "BC" and "AD," not secular scholars' "BCE" and "CE." "It's still the same thing. It's still anchoring it to Jesus." He spoke with admiration how the Gregorian calendar, in replacing the Julian calendar, neatly made a series of corrections to fit the length of the astronomical year. "The Gregorian calendar was brilliantly conceived by Jesuit priests, a very smart order. The Jesuits figured that out. They contributed brilliantly. So I am not going to wipe that out."

"Two more examples," he offered. His favorite musical is *Jesus Christ Superstar* (to which Leighann Lord expressed amazement, noting, "I don't know how many atheists would say that.")

"*Godspeed*" is a common signoff in spacecraft communications, and he has used that expression himself. Someone once complained to him that an atheist wouldn't say *Godspeed*. "So I am behaving in ways that other atheists don't want me to or different from what they think I should," he said. "*Godspeed* has

Several viewers of the Neil deGrasse Tyson Skeptical Inquirer Presents conversation asked about the artwork seen in the background at his home. He asked if we might give this more complete information about it: *Black Swan* and *White Swan* limited edition serigraph prints by Coast Salish artist Jane Kwatleematt Marston. Please visit @InuitGalleryVan for more information about this artist and her work.

become a mantra for everyone going into space. But it's now just a word, a gesture that's used." Think about the word *Goodbye*, he suggested. Everyone uses it. Its origin is "God be with you," he noted. "Yet everyone says goodbye. So I deeply respect culture and how culture affects thought. So I simply say I'm agnostic … I don't like labels. It's a lazy way to not have a conversation. It converts to tribalism."

As for skepticism, he considers it important but has some concerns about effectiveness. "We have more flat-earthers and anti-vaxxers than ever before." Lord suggested that without the skeptics movement things might be even worse, and Tyson seemed to agree, noting, "I'm not in the trenches. … I'm watching from a distance."

"The general skeptics movement—I am a little disappointed. There's almost a certain posture of righteousness we all carry. A sense of intellectual superiority that oozes out the pores of informed skeptics." Is that effective? he asked. "There is a gap between talking with each other and converting others."

He urges skeptics and also atheists to "have some sensitivity." If you have an encounter with someone who is a flat-earther or a believer in whatever, "that might be your only chance" to persuade them to a more realistic view.

"The Skeptical Inquirer is one of my favorite magazines," he said. He noted with pride that he has every issue back to the beginning when (for the first three issues in 1977 and 1978) it was called *The Zetetic*. "Why does it not have a million subscribers?"

"I invest considerable time in how people think. What receptors they have for learning. If you go 90 percent of the way to them, you might have a chance. Go figure it out. Learn it, so that you can then get access to those receptors."

"We're all on the same side here," he concluded. "We all want to move into a rational world. It's an eternal battle but a battle worth fighting."

Kendrick Frazier is editor of the Skeptical Inquirer.

Psychologists Publish Major Critique of Western Contemporary Astrology

Kendrick Frazier

Psychology professors Ivan W. Kelly and Don H. Saklofske have written and published online a new major critique of Western astrology. Their fifty-six-page paper, "Contemporary Western Astrology: A Philosophical Critique 2021," is a thorough critical examination of the concepts and assumptions underlying most astrologers in the contemporary Western world (Europe and North America). Its focus is on conceptual and philosophical issues rather than the massive empirical literature examining astrology. That literature has also found astrology wanting (for *that*, they refer us to another 2021 critical review of a thousand empirical studies by Dean, Mather, Nias, and Smit, available for free online at www. astrology-and-science.com).

The full paper by Kelly and Saklofske concludes:

> Our present examination of astrology, *as currently practiced* by most Western astrologers, indicates that it not only does not have any fit with any fields of contemporary physical or social sciences, … claims by astrologers that it is an occult field or a post-materialistic science are just expressions of wishful thinking and dogmatic belief to circumvent criticism. Claims that astrology is a science or even a transcendent science rest on deeply problematic beliefs from beginning to end.

Kelly, professor emeritus of psychology at the University of Saskatchewan and a longtime scientific consultant for the Committee for Skeptical Inquiry, has given us permission to present here the abstract of their philosophical critique. It is an excellent summary of their examination and conclusions. The full paper is available at Ivan William Kelly, Research Gate.

Contemporary Western Astrology: A Philosophical Critique 2021

Ivan W. Kelly Professor Emeritus, University of Saskatchewan, Canada

Don H. Saklofske
University of Western Ontario, Canada

The focus of this paper is on contemporary natal astrology (which is centered on one's birthdate) as construed by most Western astrologers. Astrology is not based on observation as many astrologers contend, but on conventional and arbitrary associations from mythology, the sounds of words, names, associations based on color, analogy, and metaphor. Astrology as typically practiced has no plausible non-paranormal explanation (it is not even

clear by any means what even a paranormal or supernatural explanation for astrology would look like). At all levels its claims are at variance with scientific findings across social and natural science fields. Despite the conventional nature of astrological symbolism, as in all paranormal fields, the interests of followers will be kept up by the announcements of startling new positive findings, every once in a while. The reader needs to be aware that we have been here before when it comes to astrology. Such announcements also need to confront the fact that one-thousand studies have been conducted on astrological claims (a large number by astrologers anxious to find support for their beliefs) and no reliable, repeatable studies have emerged (Dean, Mather, Nias, & Smit 2021). Given the extravagant claims of astrologers (check any bookstore or astrology site) that astrology is ubiquitous, its claims should be easily uncovered. The fact that they are not easily uncovered, if at all, is evidence itself against astrology. The further fact that astrologers have to come up with increasing complex and metaphysical explanations to account for it being difficult to uncover what is supposedly obvious (i.e., astrology as described by its practitioners), is a further indicator of astrological desperation. Our critique casts serious doubt on the foundations of Western astrology, showing that in its contemporary forms it is incapable of generating knowledge.

Kelly, Australian psychologist (and CSI Fellow) Geoffrey Dean, and Saklofske have also recently published a shorter critique of astrology in the journal *Physics in Canada* ("Astrology for the Physicist," 76(1): 1–7, 2020). They write: "Arguably astrology has little to contribute to human understanding except fantasy. Yes, it is part of our past, but why should it be part of our future?" For lessons learned, they compare it to the one-time popular practice of phrenology and end: "Astrology could hardly be better suited to the scientific study of pseudoscience. In terms of longevity and ongoing popularity it has a clear edge over other questionable beliefs. For every student of pseudoscience, astrology would seem a good place to start."

Astrophysicist and Skeptic Cornelis de Jager (1921–2021)

Jan Willem Nienhuys

Noted astronomer and skeptic Cornelis (Kees) de Jager died on May 27, 2021, at the age of 100. He was cofounder of the Dutch skeptical organization Skepsis and its first chairman from 1987 to 1997. He was a longtime fellow of the Committee for Skeptical Inquiry.

When Paul Kurtz spoke on January 12, 1987, with a couple of Dutch readers of Skeptical Inquirer about setting up a Dutch skeptical organization, one of the attendants was Kees de Jager. He was freshly retired as professor of astrophysics and space physics and had completed a second stint as president of the Committee on Space Research—one of almost a dozen leading functions in international organizations he had held. He had founded a laboratory for space research that quickly had become a top European institute. It specialized, among other things, in making instruments for observing X-rays from the sun and other stars.

He was also very active in popularizing science, for example lecturing in high schools. So when nine months later on a second such meeting it was announced that De Jager would be chairman of Skepsis, this was a great honor for the skeptical movement.

Kees de Jager (his surname suggests an ancestor towing canal boats) was born April 29, 1921, on the Dutch isle of Texel but spent most of his youth in the Dutch East Indies (now Indonesia), where his father had accepted a post as head of a primary school. De Jager returned to the Netherlands to study science and quickly opted for astronomy. A major part of his time as a student he spent in hiding, because he refused to pledge loyalty to the Germans, who had occupied the Netherlands in 1940. De Jager's hiding place was in the Utrecht Observatory, which would in 1963 become his home.

Cornelis (Kees) de Jager. Credit: Rob Rutten - http://www.staff.science.uu.nl/~rutte101/Rob_s_astronomer_shots.html

His research contributions included the structure and dynamics of the solar atmosphere; the study of the most luminous stars, including determination of their motions; the instability of the atmospheres of such stars; the discovery of the "yellow evolutionary void" in hypergiant star evolution; and the studies of the solar dynamo and of sun-climate relationships, including the main role of UV variation on climate. He had served as director of the Utrecht Observatory, general secretary of the International Astronomical Union, and president of the International Council of Scientific Unions. He also founded the journals *Space Science Reviews* and *Solar Physics*.

De Jager's skeptical activities were mostly organizational, but he did attend various skeptical conferences. Two of his contributions there explained how to extract meaning from random numbers: various measurements on his bicycle and

markings and cracks along the hallway in his house. The former yielded various universal constants and the latter, surprisingly, revealed both the end of time (to the nearest minute!) and the location of the Big Bang, which happened to be in the park in front of his home. (His Skeptical Inquirer article about all this, "Adventures in Science and Cyclosophy," in SI's Winter 1992 issue, became one of SI's most popular articles. It is available on SI's website.)

At yet another conference, he likened science to the profession of his maternal grandfather, who built windmills. Just like a millwright, the practical scientist isn't much interested in the philosophy of his trade. All the same, De Jager thought that pseudoscientists usually are too much in love with their own theories; they reject and select evidence and mistake correlation for causation.

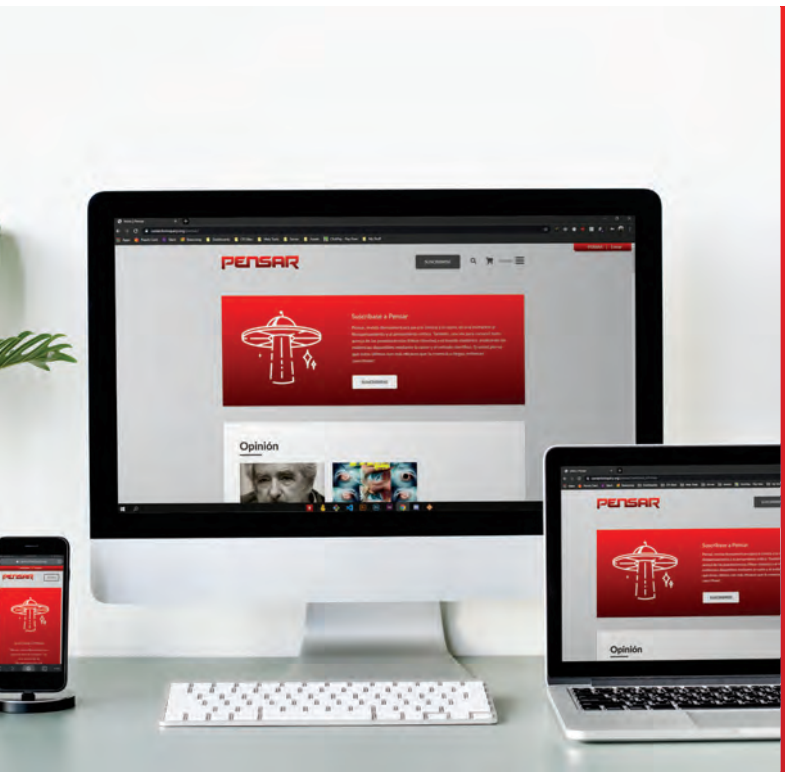
In 1994, he became the first chairman of the European Council of Skeptical Organisations.

Around the beginning of 1991, he had an idea for explaining the so-called Mars Effect (the claim that sports champions are born a few percentage points more often at particular Mars positions than common citizens). This effect, proposed by French psychologist Michel Gauquelin, was considered the most reliably proven astrological effect, but tests had already resulted in acrimonious debates. De Jager's idea snowballed, and a part of the 1991 European Skeptical Conference held in Amsterdam was dedicated to this subject. Eventually these efforts petered out in the conviction that there was not a Mars effect but instead a Gauquelin effect. However, the amount of data this effort produced, together with my efforts to edit the conference proceedings, led to my own involvement—with De Jager's encouragement.

De Jager thought that pseudoscientists usually are too much in love with their own theories; they reject and select evidence and mistake correlation for causation.

De Jager was also an enthusiastic long-distance runner, and he ran the New York marathon at the age of seventy-five. He remained active in science, even after moving back to his native Texel in 2003. Last year, his season's greetings were an announcement of a book on the relation between the magnetism of the sun and the climate on earth. His one-hundredth birthday was celebrated by an online event, though he had become too weak to appear. De Jager was exceptional in many respects, but for me he is unforgettable, because he was such a nice man—always kind and cordial and willing to help. He set an example that I try to follow.

Jan Willem Nienhuys is a mathematician, formerly at Eindhoven University of Technology. He is secretary of the board of the Dutch Skeptics group Skepsis and a fellow of the Committee for Skeptical Inquiry.



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Free Online Astronomy Textbook Reaches Half a Million Students

The free, online, open-source, introductory textbook *Astronomy*, published by the nonprofit OpenStax project at Rice University, has recently reached the milestone of having been read by over half a million students since it was published in 2017. The book was written by astronomers Andrew Fraknoi, David Morrison, and Sidney Wolff, with the help of about seventy other astronomers and educators. The authors are at Foothill College, NASA Ames Research Center, and the National Optical Astronomy Observatory, respectively. Fraknoi and Morrison are both fellows of CSI.

The book is part of an initiative, funded by the Gates, Hewlett, and other major foundations, to provide a high-quality, free textbook for every introductory course taken by students in the first two years of college, thus reducing the often onerous costs of a college education. The publisher estimates that the *Astronomy* text alone has already

saved students in North America approximately $40 million.

As you might expect from authors associated with CSI, a key focus of the book is to teach students skeptical thinking and to ask "How do we know?" about our current picture of the universe. The book includes:

- a section in which students are encouraged to think how we know Earth is round and not flat (and then shown various experiments that establish this);
- a clear discussion of astrology, how it differs from astronomy, and what tests show that astrology is not a working hypothesis;
- a link (in the chapter on the Moon) to a skeptical article that explains the evidence that NASA really did go to the Moon and the Moon landings were not faked;
- a chapter devoted to the *scientific* search for life elsewhere in the universe and the experiments that are under way to find it.

The book is available, completely free to anyone, at: http://openstax.org/details/astronomy.

Myth Busted: Cucumber Does Not Repel Ants

Look up "natural" ant repellents online, and you are bound to find cucumber listed as an easy home remedy to ant infestation. Is there any truth to this? A National Taiwan University entomologist, Prof. Matan Shelomi, discovered that there was no actual scientific evidence for or against this claim, so he decided to test it himself. The results, using cucumber peel extracts in different solvents, were underwhelming.

"While some extracts did have detectable effects on the ants," says Shelomi, "the effects are weak and likely very short lived." Less than half of the ants seemed bothered by the cucumber at any given time, and there was nothing approaching the miraculous repellency promised online. In a recent paper in the journal *Sociobiology* (68[2]:5813), he wrote, "Cucumber may indeed repel some ants, slightly, sometimes," for at least fifteen minutes, so not exactly promising … and that was with chemical extracts of peel. Whole cucumber is probably even less effective: "Ants readily eat cucumbers," says Shelomi, "so spreading cucumber slices around your home is like giving ants a free buffet."

The study not only busted an old myth but also criticized "natural" remedy research in general. "There are so many papers, of varying quality, where researchers take whatever plant or food they have on hand, extract oils from it, and test it on insects or microbes or whatnot using ridiculously high concentrations in unrealistic conditions," says Shelomi. "Then, as long as they find something with a significant p-value, they call it a 'promising' new treatment." Such research does not provide practical information and almost never includes safety information.

So what to do about an ant problem? Shelomi recommends sprinkling a mixture of sugar with borax or boric acid near the colony, which will kill the ants without posing any risk to humans or pets. Unlike cucumber, borates are safe, effective, and supported by evidence, plus they are still *natural*—if one values that word.

WHO's Suggestion That Women of Childbearing Age Not Drink

JULIA LAVARNWAY

On June 15, 2021, the World Health Organization (WHO) released the first draft of its *Global Alcohol Action Plan 2022–2030 to Strengthen Implementation of the Global Strategy to Reduce the Harmful Use of Alcohol* (WHO 2021). I'm all for reducing harmful alcohol use, but I was taken aback by the advisement that "appropriate attention should be given to … prevention of drinking among pregnant women *and women of childbearing age* …" (emphasis added; WHO 2021). And I'm not the only one; the plan's release unleashed backlash from media outlets as well as that ever-faithful cultural barometer, Twitter.

Writing in an opinion piece for NBC News.com, journalist Danielle Campoamor charged that the action plan "overlooks men, as usual" (Campoamor 2021). She's not wrong. The action plan quotes a lot of dueling men versus women statistics, for example:

> In 2016, an estimated 2.3 million deaths and 106.5 million DALYs [disability-adjusted life years] among men globally were attributable to alcohol consumption. For women, the figures were 0.7 million and 26.1 million, respectively. … According to the latest WHO global estimates, 283 million people aged 15 years and older—237 million men and 46 million women—live with alcohol use disorders (AUD), accounting for 5.1% of the global adult population.[1] (WHO 2021)

Yet despite disclosing these facts, the WHO chose to admonish women of childbearing age rather than their male counterparts capable of fathering children. By the WHO's own data, more men than women are problem drinkers—and of course a single man can impregnant numerous women in a year while a woman can have only one pregnancy in the same amount of time. So who is more likely to increase birth defects in the population? I don't think it's the non-pregnant ladies who enjoy an IPA here and there.

"But, but …" I hear some people sputtering (not *you*, obviously, but that other guy over there), "women are the ones who carry the babies. What does male alcohol consumption have to do with anything? Isn't the WHO just protecting the babies with this suggestion?" *Au contraire, mon ami*. The science says that the WHO may be misplacing the responsibility by placing it on women alone. As Campoamor points out in her piece, according to Dr. Qiongjie Zhou and colleagues, "*Paternal* alcohol exposure biologically increases the risk of genetic and epigenetic sperm abnormalities. … A paternal drinking rate of 31.0% [of the sample size of men in the study] *substantially elevated the risk of birth defects*" (emphasis added; Zhou et al. 2021).

The British Pregnancy Advisory Service came out swinging in response

Charlie @urbanwriters · Jun 19
I intend to have an alcoholic drink tonight for the fourth evening in a row. Not something I normally do, but as a woman of childbearing age I feel it is my duty.
21
38
921
Charlie @urbanwriters · Jun 20
Let's make that the fifth night.
3
20

to the action plan; its chief executive Clare Murphy said:

> Currently there is no consensus regarding whether low to mid-level alcohol consumption during pregnancy is actually harmful [see, for example, Horsager-Boehrer 2016], so to extend this messaging back into the "pre-pregnant" period, regardless of individual pregnancy intention, is completely absurd. (BPAS 2021)

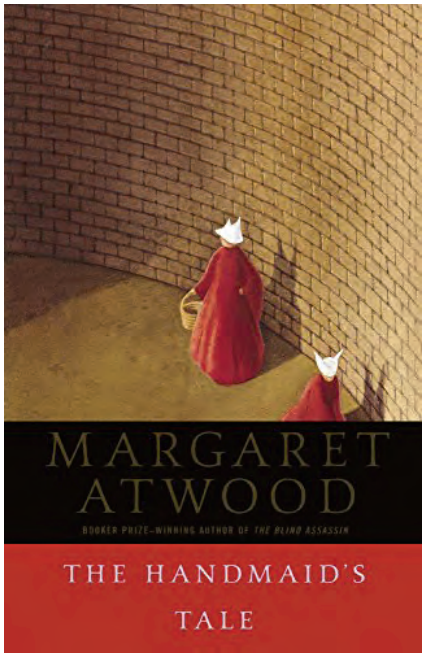
That's right, folks: Shocking as it might sound, not all women of childbearing age even want to have children—as Campoamor put it, "'women of childbearing age' are not pre-pregnant women. We're women."

A few media outlets said the WHO's nugget of advice for women of childbearing age harkened back to the fictitious Gilead, the totalitarian society in Margaret Atwood's 1985 novel *The Handmaid's Tale* (Kazi 2021). In Atwood's dystopian nightmare—although some anti-choice conservatives probably consider it a wet dream—women capable of childbearing are prisoners of the state who are forced to give birth to the children of the elite.

Of course there was a lot of the almost requisite "That's not what they said/meant/wrote!" Writing for Snopes.com, Nur Ibrahim labeled the claim that "The World Health Organization (WHO) proposed a ban on women of childbearing age drinking alcohol …" as false. Technically, it's true that the claim of a *ban* is false, but many people who search for it on the website will just see the "FALSE" label and may assume the backlash over the action plan has no merit. Pointing out that the WHO didn't propose a ban on women of childbearing age drinking alcohol kind of misses the point. The WHO didn't propose a ban per se—but it did suggest preventing all childbearing women from consuming alcohol.

In response to the outcry, the WHO told *Newsweek*:

> The current draft of WHO's global action plan does not recommend abstinence of all women who are of an age at which they could become pregnant. However it does seek to raise awareness of the serious consequences that can result from drinking alcohol while pregnant, even when the pregnancy is not yet known. (Kazi 2021)



This smacks of panicked backpedaling. The WHO can claim the action plan "does not recommend abstinence of all women who are of an age at which they could become pregnant" all they want, but that doesn't make it true. The first draft of the action plan is out in the wild, and it explicitly mentions "women of childbearing age" without any qualifications.

There is a world of difference between the categories of *all women of childbearing age* and *women who don't yet know they are pregnant*, the latter representing only a tiny sliver of the former. Do we really want to say all women up to age fifty should avoid drinking because an extremely small number of them may not yet know they are pregnant? I guess these people have never heard of "drink 'til it's pink."[2]

So is the WHO's action plan sexist? I would say definitively that it is. Even though science points to pre-pregnancy alcohol consumption in both males *and* females elevating the risk for birth defects, the WHO called out only women. In a time when science and medicine are being discounted by so many, it is imperative that our representative organizations get it right. Bringing sexism into scientific guidelines does men and women alike a grave disservice. ■

Notes

1. Yes, those furious calculations you are conducting in your head are correct: over *three times* more men than women had alcohol-related deaths in 2016, and over *five times* as many men as women have alcohol use disorders.

2. In case you haven't heard of it either, "drink 'til it's pink" refers to some obstetricians' advice that it is okay to drink moderately until a pregnancy test comes back positive, in contrast with those who say "stay sober 'til it's over."

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[INVESTIGATIVE FILES JOE NICKELL

Joe Nickell, PhD, is CSI's senior research fellow. He is a former Pinkerton detective and author of nearly fifty books, including the police science textbook *Crime Science*.

Solving a UFOlogical 'Murder': The Case of Morris K. Jessup

Among the borderlands of the paranormal, few exploits are stranger than those relating to supposed extraterrestrial phenomena. Take, for example, the fate of flying saucer writer Morris K. Jessup, who became entangled in various UFO conspiracy theories.

Jessup led a life that threatened to become frustratingly comic, except that its mix of far-out alien claims and increasingly depressing failures led to more and more sensational and tragic consequences. It ended in what some of his fellow UFO travelers believed was "too mysterious" to be anything other than deliberate murder covering up fearsome truths—although some acknowledged it might appear otherwise.

Early Years

Morris Ketchum Jessup (1900–1959) was born on a farm near Rockville, Indiana, to George W. and Edna (Swain) Jessup. In 1918, he joined the navy, then entered R.O.T.C. at the University of Michigan in Ann Arbor.

He remained there for several years, doing undergraduate and graduate studies that led to a bachelor of science in astronomy in 1925. He worked as an observer at the Lamont-Hussey Observatory, associated with the university, and received his master of science degree in 1926.

Jessup even pursued a PhD in astrophysics, but in the spring of 1931 something happened: According to university records, he stopped work on his dissertation and never achieved a doctorate (Oberg 2001). This would appear consistent either with him deciding to abandon his pursuit or the university ending it for him, perhaps due to his failing to pass his doctoral exam. Nevertheless, "in later years he would often be called 'Dr. Jessup'" (Clark 1998, 1:544).

Relatively little is known of his life after he first left the University of Michigan. It has been reported that he had some later position at Drake University (in Des Moines, Iowa). However, records of his employment are not found at Drake. Instead, "Some tales," reports James Oberg (2001, 276–277), place him in the Andes "investigating" Inca ruins and in Mexico in the early 1950s, charting what he asserted were

"alien" structures. In any case, he was reportedly "employed for most of his life as an automobile-parts salesman and a photographer" ("Morris K. Jessup" 2021).

A Developing Unreality

Jessup joined the speculative field of extraterrestrial visitation. That developed in the wake of strange aerial crafts reported on June 24, 1947, when businessman Kenneth Arnold was flying his private airplane over the Cascade Mountains of Washington State. Arnold described a chain of nine objects, each flying with a motion like "a saucer skipped across water," and a mythology burgeoned. By the 1950s, "theories" about extraterrestrials and "flying saucers" (later "unidentified flying objects" or UFOs [Nickell 1995, 185–220]) proliferated.

Morris Jessup is sometimes said to have "pioneered" in the fantastical field of UFOs and UFOlogy—although the term *pioneer* is otherwise usually meant favorably. UFOlogical historian Jerome Clark (1998, 1:545) suggests that reading Jessup's first book, *The Case for the UFO* (1955), is rather like browsing through books by Charles Fort (1874–1932). Fort loved to taunt "orthodox" scientists with mysterious phenomena they could not explain—often now termed "Fortean" phenomena after him.

Jessup's book became famous for what is known as the "Allende letters." That mystery surfaced in 1956 with a copy of Jessup's book annotated by three individuals ("Mr. A," "Mr. B," and "Jemi"). Together with a series of letters by one Carlos Allende (a.k.a. Carl M. Allen), written to Jessup, the volume arrived at the U.S. Office of Naval Research (ONR). The writings appeared to indicate that the individuals had knowledge about alien cultures and their saucer travel—far beyond that of any government—provoking the ONR's interest. The Navy reportedly contacted Jessup, but in fact it was only some credulous officers who chipped in to finance a limited-edition copy of the annotated *Case* and letters.

This obvious hoax became notorious for initiating one of UFOdom's most persistent conspiracy theories—known today as "The Philadelphia Experiment" from a 1979 book of that title by William L. Moore. Briefly (because that is all the time the foolishness is worth), the "experiment" concerned nothing less than the *teleportation of a U.S. Navy ship from its Philadelphia dock to one in Virginia and back*. Every hoax should have a sequel, and this one is concise: Allende (that is, Allen) eventually confessed that he had made up the entire tale and gave prominent UFOlogist Jim Lorenzen a signed statement to that effect (Randle 2001; Clark 1998, 1:67–70, 544–547).

This obvious hoax became notorious for initiating one of UFOdom's most persistent conspiracy theories—known today as "The Philadelphia Experiment."

Jessup also fell for the bogus Oliver Lerch disappearance story, which I have traced back from 1962 and 1948 accounts, showing it existed prior to 1932. I demonstrated that the tales were fictitious versions of a proliferating hoax. The original ultimately derived from a short story by Ambrose Bierce titled "Charles Ashmore's Trail," which was published in 1893 (Nickell with Fischer 1988, 61–73; Clark 1998, 1:545).

Jessup was taken in by other hoaxes and fanciful notions. One was his belief in the elaborate concept now known—from the later books by Erich von Däniken (e.g., *Chariots of the Gods?* [1970]) and others—as "ancient astronauts." Supposedly, humanoid extraterrestrials came to Earth in the distant past and created humankind, together with human civilization. Still another of Jessup's fixations was on the disappearances of airplanes and ships, what later writers would call the "Bermuda Triangle" phenomenon, which has been discredited (Kusche 1986).

Jessup's next two books came out in 1956. *The UFO Annual* was something of an anthology about UFOs and other Fortean anomalies. Jessup once told fellow UFO writer Gray Barker (1971, 8–12) that he had done little work on it and that his literary agent had largely assembled it out of news clippings. His second volume of that year was *UFO* [*sic*] *and the Bible*, an attempt to link miracles of the Old and New Testaments with extraterrestrial visitations (Clark 1998, 1:545).

In 1957, Jessup published his fourth and last book, *The Expanding Case for the UFO*. A truly eccentric work, its central idea is that pygmy races might have colonized first the Moon and then Earth. Not surprisingly, his publisher (Citadel Press) rejected subsequent manuscripts, and he briefly considered publishing and selling his books by mail (Clark 1998, 1:545–546).

Victim of Murder?

As flying saucers ceased to bring Morris Jessup a satisfactory living, he turned to other fanciful endeavors. He eked out a subsistence salary by becoming editor of a fringe astrological publication, and he also developed an increasing fascination with psychic phenomena. In 1956, Jessup was attracted to a proposed expedition to study meteorite craters in Mexico (where he hoped to find further evidence of ancient astronauts). However, when a planned participant, the University of Michigan, discovered that Jessup was to participate, the project was canceled (Clark 1998, 1:546). (It would appear that the university still recalled its former PhD candidate, whose failure might well have been due to his unscholarly ideation.)

Then in April 1959 came word that Morris K. Jessup was dead. Even before an official ruling was issued, saucer conspiracy theorists gave their knee-jerk response to the supposed "mystery." Even now, according to James Oberg (2001, 277), "Some UFO buffs suggest he was murdered to silence some secret knowledge connected with the Bermuda Triangle or the 'Philadelphia Experiment.'"

Jessup's death was an opportunity for

Gray Barker (1925–1984) to profit from Jessup's demise. He published his mystery-mongering edited collection, *The Strange Case of Dr. M.K. Jessup* (1963)—his title managing to award Jessup his PhD posthumously. He also wrote a later assessment, "The Enigma of M.K. Jessup" (Barker 1971).

Barker's Saucerian Press published still another book about Jessup. By Anna Lykins Genslinger, it was titled *The Jessup Dimension* (1981). She determined what really happened regarding Jessup's demise, she says, through the guidance of his ghost, whom she refers to by the name "Ketch" (an obvious play on Jessup's middle name, Ketchum).

As Genslinger thus divined, Morris K. Jessup was the victim of secret government entities who were concerned about his special knowledge of such matters as the Philadelphia Experiment. Publisher Barker himself had already launched the legend in UFOlogy now famously known as the Men in Black (MIB) in his book *They Knew Too Much about Flying Saucers* (1956). The MIB were dark-suited enforcers who leaned on UFO researchers daring to get too close to unspeakable UFO secrets (Clark 1998, 1:546, 2:622).

'Psychological Autopsy'

If there is any mystery about the death of Morris K. Jessup, however, it is in the minds of UFO conspiracy theorists. The facts in the case are these.

On April 20, 1959, Jessup drove to Dade County Park, a site near his Florida home. At 6:30 p.m., he was discovered unconscious in his vehicle. He died soon thereafter. The cause of death was carbon-monoxide poisoning.

The evidence on site left little doubt as to what actually happened. Jessup's station wagon had a hose connected to its exhaust pipe that then ran through a partially opened rear window. The car had been left running, allowing toxic fumes to collect inside. The death was officially ruled a suicide (Clark 1998, 1:546; Oberg 2001). The only detail that gives us pause is the fact of the car having been left where it could draw attention. That situation could suggest, rather than something nefarious, the possibility that Jessup secretly hoped someone might intervene, and that is indeed what happened—if tragically too late.

In determining the mode of death in a case (natural, accidental, homicidal, or suicidal), investigators may need to probe the possibility of suicide. I have myself done this in my work over the years as a homicide consultant. The procedure in any case in which suicide may be a possibility is to conduct what is termed a "psychological autopsy." That is an investigation of a decedent's mental state prior to death (Nickell and Fischer 1999, 255, 264, 268).

Fortunately, in the Jessup case, there has grown a collection of remembrances by Jessup's acquaintances that are directly relevant to such an inquiry. What I have done is assemble them here and acknowledge them as a collective de facto psychological autopsy on Morris K. Jessup. It tells a sad story.

Following his failure to achieve academic success, Jessup's subsequent career as a UFOlogical writer also seemed to be at an end. Other failures include the University of Michigan withdrawing from an expedition that was to involve him. Two years later, after his wife, Rubye, separated from him (Clark 1998, 1:546), Jessup traveled to New York where friends thought he seemed unstable ("Morris K. Jessup" 2021). He met with Ivan T. Sanderson, a zoologist and paranormal writer, who found him in a depressed state. Jessup complained that certain strange happenings—which he seemed unwilling to talk about—had pulled him into what Sanderson (1968) described as a world of unreality.

Later, he showed up again in Florida, explaining to inquirers that he had been in a serious automobile accident there and seeming despondent over his slow recovery ("Morris K. Jessup" 2021). In mid-April of 1959, only a few days before his death, he wrote to a friend, New York radio host Long John Nebel, what Sanderson described as an outright suicide letter. In it, Jessup proposed that after his death Nebel stage an on-air séance to contact his spirit (Sanderson 1968).

Some of Morris Jessup's friends came to suggest that he may have been driven to suicide by his facing ridicule over the Philadelphia Experiment case ("Morris K. Jessup" 2021). Jessup may have come to realize he had been made a fool of by "Carlos Allende" (a.k.a. Carl M. Allen) and his elaborate hoax tale. Moreover, Jessup "had discussed suicide with friends, for several months" ("Morris K. Jessup" 2021). One such person, Sabina Sanderson, who saw one of Jessup's letters written in his last days, stated that that "letter makes it clear that he chose suicide as the only possible alternative to an insupportable future and did so after careful consideration." She added, "Certainly the mysterious 'they' had nothing to do with it" (Sanderson 1975).

When all these observations and interpretations are taken together, it is clear that Morris K. Jessup died by his own hand, and no Men in Black were involved. Like one of the saucers he had imagined, Jessup's career had soared briefly and crashed, becoming part of the folklore of the beckoning skies. ■

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[NOTES ON A STRANGE WORLD MASSIMO POLIDORO

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How Insecurity and Disinformation Create Conspiracy Theorists

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On August 29, 2020, about 18,000 people gathered in Berlin, Germany, either denying the existence of COVID-19 or contesting decisions taken to contain it. Among the gatherers were conspiracy theorists of all sorts, chemtrail believers, followers of QAnon, anti-vaccination advocates, homeopaths, people like Robert Kennedy Jr., and right-wing extremists who, waving Third Reich flags, attempted to storm the Reichstag, the seat of the German parliament.

A week later, on September 5, it was Rome's turn. Fifteen hundred people found themselves in Piazza Bocca della Verità denying the existence of COVID-19, flaunting the absence of masks, and shouting against the "health dictatorship" that had been imposed by the government. Again, anti-vaccination advocates, 5G alarmists, and representatives of Forza Nuova (an extreme right-wing group that organized the event) spoke from the stage, declaring Trump and Putin friends of humanity while railing against the usual targets of the conspiracy theorists: the New World Order, Bill Gates, Hillary Clinton, Barack Obama, George Soros, and others.

And then there was January 6, 2021, when the United States Capitol was assaulted by a similar mix of conspiracy theorists, QAnon believers, and right-wing militias.

Certainly, these gatherings included confused or frightened people who felt dissatisfied with their lives and the current situation. But, in the case of those most convinced, what leads them to deny the truth? And is it correct to call these people *deniers*?

"The characteristic of a lie is that

of presenting itself as truth … When a fictional tale is well thought out, it does not contain within itself the means to be demolished as such," wrote the French historian Pierre Vidal-Naquet (2005). He was referring to revisionism on the Holocaust, but his discourse is in fact valid for any form of denial.

Those who deny the moon landing, evolution, global warming, the Holocaust, COVID-19, or President Biden's victory sometimes live in a closed world. It's a place where conclusions are reached before having all the facts and people delude themselves at different levels, believing they are independent thinkers or champions of truth. They never realize that they have embraced a faith that can only exist if it doesn't address fact and truth.

It is clear that we are faced with people who have decided to consider facts and scientific evidence as optional—people for whom what they believe is more important than what the facts show. But it would be a mistake to think that they are just paranoid or crazy.

The difference between those who believe in conspiracy theories and those who do not should not be interpreted in terms of an opposition between sick and healthy people. It is not the paranoid on one side and the rational human beings on the other but rather a competition between different versions and sources aimed at understanding social reality.

Of course not every interpretation of an event has the same validity. Different versions can be rationally analyzed and compared to understand which explanations are justified and which are not.

For this to happen, motivations, interests, cognitive skills, and a desire for in-depth study are necessary; these are all resources that we usefully employ every day in addressing the most important problems of our existence but that, for obvious economic reasons, we cannot apply in many other relevant areas.

Conspiracy theories and denialisms, in short, can be framed as one of the ways that people have of explaining the reality of certain events. They attribute meaning to a fragmented world characterized by uncertainty—a world that they often reject—and in this way reduce their sense of anxiety.

Recent studies seem to confirm that a state of anxiety can push people to think in a way that is closer to a conspiracy mentality. In May 2018, the American Psychiatric Association presented the results of a survey conducted in the United States that showed that 39 percent of Americans were more anxious than they were the previous year, especially regarding health, relationships, security, politics, and the economy (American Psychiatric Association 2019).

The data are corroborated by other reports, such as another Pew Research Center poll from the same year showing that a majority of both Democrats and Republicans feel that their party has lost ground, in recent years, on issues they consider important (Loggia 2019). It would be interesting to know today, in the aftermath of Trump's attempted coup d'état with disinformation and conspiracy theories, what the American people think about these issues.

These existential crises, combined with the idea of not having a say in important matters, fuels conspiracy thinking. In these situations, conspiracy theories offer comfort because they provide comfortable scapegoats and make the world seem simpler and more controllable than it actually is.

These people, in short, can believe that if there were no bad guys, then everything would be fine. Instead, those who don't believe in conspiracy theories simply have to admit that bad things, or things we don't like, happen and are out of our control.

Mechanisms to protect one's self-esteem seem to come into play, which allow one to attribute responsibility for one's own disadvantage or one's values to specific subjects or to the system in general.

It is therefore a question of finding a way to counter conspiracy theories without questioning the identity of a person. As Joanne Miller, a professor of political science at the University of Minnesota, and colleagues put it: we should not attack individual beliefs but rather the reasons that lead people to believe conspiracy theories (Miller et al. 2016).

It means working to improve citizens' trust in institutions and in those who govern, but it also means addressing the profound sense of anxiety that surrounds people in the face of a complex—and in many ways frightening—world. Why are there conspiracy theories about the 2020 election, 9/11 attacks, or, even before that, the assassination of President Kennedy? Why is the idea of a pandemic that puts the entire planet in crisis rejected? Because they are unpredictable (or unwanted by many, as in the case of Trump's loss) events that are, as such, terrifying. If not even the strongest country in the world, the United States, its president, or even the entire planet, can be considered safe, then it means that none of us can ever truly be safe. And that's what frightens us.

It is much more reassuring to think that these events are the result of elaborate plans put in place by some powerful, hidden, evil cabal. Believing this is tantamount to thinking that someone always has the world's situation under control, even if it is someone with evil intentions. It means that we are not at the mercy of chance and that, at worst, we only need to find a way to take the "bad guys" out of the picture.

One can imagine fighting against the Jews, George Soros, Bill Gates, Joe Biden, or even Reptilians and Satanists. But fighting against chance and the unpredictable is impossible. ■

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[REALITY IS THE BEST MEDICINE HARRIET HALL

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Observational Studies and Experimental Studies

Medical research studies can be divided into two types: observational and experimental. Observational studies simply observe the effect of a variable in a population. They can assess the strength of a relationship, for instance between dietary factors and disease. Are vegetarians less likely to develop cancer? Are patients treated with a new diabetes drug less likely to die of heart attacks than patients treated with older drugs?

Two types of observational studies are cohort and case-control studies. In a cohort study, a set of people with defined characteristics (for instance, patients who have been diagnosed with diabetes) are observed over a period of time to determine whether a variable (such as treatment with a new drug) is associated with better outcomes (such as fewer deaths or hospitalizations). Cohort studies can be prospective or retrospective, the latter being less reliable because they depend on patient reports of past events and are subject to recall bias and faulty memory.

In a case-control study, individuals who have a disease are matched to individuals who don't have the disease but otherwise appear to be identical. There's a problem, however: they may not be as identical as they first appear. There is always a risk that confounding factors may have been missed. When matching individuals, no one would think to ask them what brand of spaghetti sauce they've been buying, but what if more people in the disease group have switched to a new brand that just happens to contain an herb that is effective in combatting the disease in question? As Donald Rumsfeld pointed out, there are known knowns and known unknowns, but the difficult ones are the unknown unknowns. If we don't know we don't know about some confounding factor, there's no way we can control for it.

Correlation Is Not Causation

Observational studies are useful for finding correlations. They may find

that the more meat people eat, the more likely they are to die from a heart attack. But we can't stress often enough that correlation is not causation. If A is correlated to B, that doesn't tell us that A *causes* B. Maybe B causes A. Maybe both A and B are caused by another factor, C. Maybe it's not a true correlation but a false finding due to errors in the way the study was designed or carried out. Maybe the apparent correlation is a meaningless coincidence. That happens a lot.

There is a whole website dedicated to spurious correlations, a hilarious compilation by Tyler Vigen. The website shows graphs and calculates correlation percentages for an astounding 30,000 examples. If you've never seen it, it's well worth a look. The divorce rate in Maine is correlated with the per capita consumption of margarine. The number of suicides by hanging, strangulation, and suffocation is correlated with the number of lawyers in North Carolina. A widely cited example is the almost perfect correlation between diagnoses of autism and sales of organic foods ($r=0.9971$, $p<0.0001$). I don't think anyone imagines that organic foods cause autism or that autism causes increases in organic food sales. The correlation is obviously a meaningless coincidence. And yet …

Many journalists who write about medical research are not well versed in science and critical thinking. They persist in reporting correlations from observational studies as evidence of causation. The media are full of alarmist headlines such as "Study Shows Eating X Causes Disease Y" and "If You Want to Avoid Disease Y, Stop Eating X." In my humble opinion, journalists who misreport correlation as causation should be fired and required to get remedial education.

The Bradford Hill criteria for causation is a list of nine principles that can help establish whether a correlation represents causation. They are:

1. Strength (effect size)
2. Consistency (reproducibility)
3. Specificity
4. Temporality (effect occurs after cause)
5. Biological gradient (dose-response relationship)
6. Plausibility
7. Coherence between different kinds of evidence
8. Experimental confirmation
9. Analogy with other associations

Some authors add a tenth principle: Reversibility (if the cause is deleted, the effect should disappear).

Experimental Studies

Observational studies can produce suggestive correlations but can't establish causation. For that, we need the other kind of study: experimental studies. In an experimental study, the researchers introduce an intervention and study its effects. If eating X is correlated with Y, does changing the amount of X in the diet result in different outcomes? The gold standard experimental study is the randomized controlled trial (RCT), preferably double blinded.

Sometimes an experimental study is neither possible nor feasible. Consider the question of whether smoking causes lung cancer. The ideal way to answer that question would be to randomize a large number of young people and make half of them start smoking and continue smoking for the rest of their lives while preventing the other half from ever smoking, and we would have to follow them over the many years it takes for lung cancer to develop. That can't be done. Even if it were ethical, there's no way to effectively control people's behavior. Slavery is not legal, and even if we could experiment on a captive population of prisoners, there's no way we could ensure that they wouldn't find ways to avoid compliance. It's not as if we could forcibly put lit cigarettes between their lips many times a day and make them inhale. And blinding would be impossible: people who smoke are well aware that they are smoking.

Fortunately, we have not had to resort to experimental studies. There is enough other evidence to have definitively established that smoking causes lung cancer. The evidence is strong, consistent, and biologically plausible. Ecological studies, epidemiologic stud-

ies, animal studies, and in vitro studies all agree. Cigarettes are known to contain carcinogens. And we know that when people stop smoking, their risk of lung cancer declines rapidly. The Bradford Hill principles are all amply met.

Problems with Randomized Controlled Trials

Randomized controlled trials are the "gold standard" of research, but they're not always appropriate, because they may miss outcomes that take a long time to develop or that affect only a small minority of people. And they may inspire false confidence. We must remember that just because a study is a double-blind, randomized controlled trial, we can't assume its conclusions are correct.

I review a lot of dietary supplements and so-called alternative medicines; sometimes they report positive results from a randomized, controlled trial that may appear to be a gold standard study but isn't. One of the biggest pitfalls is when they try to do good science on something that has never been shown to exist. I call this Tooth Fairy science: you could study how much money the Tooth Fairy leaves to children in impoverished families compared to well-to-do families; you could tabulate the median amount of money children receive for the first tooth versus the tenth tooth lost. Your study could have all the trappings of science. Your results could be replicable and statistically significant. But your information is meaningless, because there's no such thing as the Tooth Fairy. You've been misinterpreting parental behavior and popular customs and misattributing them as the actions of an imaginary being. Other nonexistent things that I have frequently seen studied are acupoints, acupuncture meridians, craniosacral skull movements and rhythmic fluctuations in the cerebrospinal fluid, Kirlian photography, and the human energy field that therapeutic touch practitioners have deluded themselves into thinking they are detecting and manipulating. There have even been RCTs on homeopathy, which is incredibly silly and not only doesn't work but couldn't possibly work as claimed.

Another frequent pitfall is reliance on a faulty research design, often called "pragmatic." The "A + B versus B" design usually compares an alternative treatment to usual care plus the alternative treatment. If you add *anything* to the usual care, it is guaranteed that the combination will look better because of expectations, suggestion, the extra attention, and the placebo response. Edzard Ernst has repeatedly criticized that design, for instance in a trial among cancer survivors with chronic musculoskeletal pain, where electroacupuncture plus usual care and auricular acupuncture plus usual care produced greater pain reduction than usual care alone.

Blinding can be difficult, but RCTs that omit blinding are suspect. In double-blind studies, neither the patient nor the provider knows whether the patient received the test treatment or the placebo. In triple-blind studies, the people who assess the outcomes are also blinded as to which group the patient was in.

Sometimes it is difficult to find an appropriate placebo that patients can't distinguish from the real thing. The best way to tell if it's a good placebo control is what I call an exit poll: after the trial is over, subjects are asked to guess whether they had been in the treatment group or the placebo group. If they can guess better than chance, either the placebo failed to fool them or the information was somehow leaked to the participants.

Sometimes it is difficult to find an appropriate placebo that patients can't distinguish from the real thing.

Research Pitfalls

John Ioannidis showed that most published research findings are false. Research is done by human researchers, who are susceptible to human errors. To list just a few of the many things that can go wrong:

- Technicians may consciously or unconsciously manipulate data to get the results they think their bosses want.
- Fabricated data: no experiment was done; the researcher just made up data.
- There may be calculation errors in the math, or the wrong statistical test may have been used.
- The published protocol may not have been followed correctly.
- Reagents may not have been properly stored.
- Scientific misconduct and fraud; it's not always detected, but 1,000 studies had to be retracted in 2014.
- Experimenter bias.
- Poor compliance of subjects.
- Results are statistically significant but not clinically significant.
- Test materials may have been contaminated.
- The equipment may not have been properly maintained or calibrated.
- Even when the data are good, the researchers may have drawn the wrong conclusion.
- Multiple endpoints may not have been corrected for.

Avoiding Errors

Peer review isn't perfect, but it can help spot errors. It is usually a mistake to believe a single study that has not been replicated or corroborated by other research groups. Even good preliminary studies are all too often followed by larger, better studies that reverse the original findings. When multiple studies disagree, a systematic review or meta-analysis can be done to help sort out the truth. But if the studies reviewed are not high-quality, it may be a matter of garbage in/garbage out.

Science is the best tool we have for understanding reality, but it's carried out by fallible humans, and results can be false or misinterpreted. Science is difficult and complicated, but don't despair! Even with all its flaws, it's still far more reliable than any other way of knowing. ■

[BEHAVIOR & BELIEF STUART VYSE

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When Is It Reasonable to Choose Ignorance?

Image Credit: Pixabay.

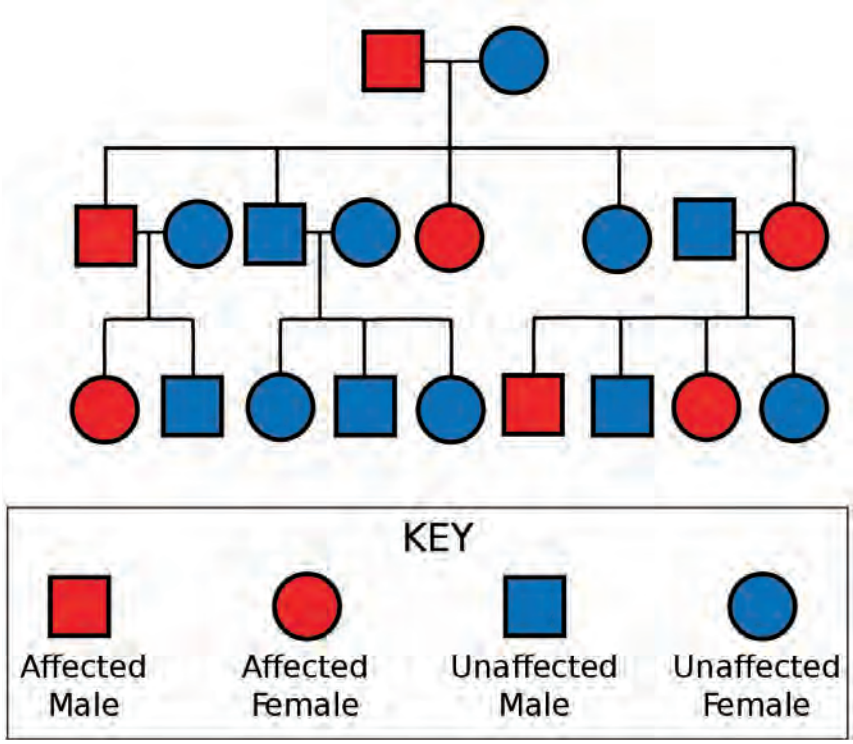
Imagine you are about to buy a new home, and the real estate agent says, "I have some more information about the maintenance history of the house. Do you want to see it?" The question seems silly; of course you do. It's a basic principle of economics and rational decision-making that when making a transaction or a choice, more information is better. Sometimes there isn't enough time to learn more or the costs involved in gaining additional data don't make it worth it. But when the information is freely available, it's better to take it in. Or is it?

Consider the following hypotheticals:

- Assume you are newly married. Would you want to know whether your marriage will end in divorce?
- Would you want to know today when you will die?
- Would you want to know today from what cause you will die?

Not unlike the real estate example, all these facts might have practical value and inform future planning, but few people want to know. A recent study of people across eleven democracies found that only 25 percent would want to know when they will die (Reisch et al. 2021). Even more striking, in a 2017 study of German citizens asked about all three above questions, the number of people wanting to know the answers never topped 5 percent (Gigerenzer and Rocio 2017).

I hear you saying, "But these are hypothetical questions that can't actually be known. What about real examples of choosing ignorance?" The classic case of what some psychologists have called *deliberate ignorance* comes from genetic testing for Huntington's Disease (HD).



Huntington's Disease is an autosomal dominant disorder that affects an average 50 percent of descendants of a parent who has the gene, regardless of sex. It does not skip a generation. Credit: Wikipedia.

HD is a progressive genetic disease with a very late onset—age thirty to fifty years—which means that before the genetic transmission was understood, many carriers passed the gene on to their children. Once HD begins, the body deteriorates, causing dementia, loss of bodily control, and, eventually, complete dependency and death (Yaniv et al. 2010). There is no cure.

The American folk singer Woody Guthrie succumbed to Huntington's Disease at a time when it was poorly understood. His wife, Marjorie Guthrie, a professional dancer, became an advocate for HD families and started an organization that became the Huntington Disease Society of America (HDSA) ("HDSA History" n.d).

In 1983, just a few months after Marjorie Guthrie died, James Gusella, a researcher associated with the HDSA, found the genetic marker for HD on the short arm of chromosome 4. HD is an autosomal dominant disorder, which means that any child of an affected parent has a 50 percent chance of acquiring the gene for HD. Within ten years, a test was developed and made available to the public, but early surveys found that only a small minority of candidates for the test wanted to take it. A summary of studies of actual use of the test in eight European countries and Canada ranged from 4 percent of at-risk individuals in Germany, Austria, and Switzerland to 24 percent in The Netherlands (Tibben 2007; Yaniv et al. 2010). Overwhelmingly, people didn't want to know. In a somewhat rambling radio interview, the singer Arlo Guthrie, Woody Guthrie's son, made it clear he was not interested in being tested (Jimbob12404yahoo 2014).

Woody Guthrie, 1943. Credit: Wikipedia.

HD is not the only case of medical testing that suffers from avoidance. Many people at risk for HIV are also reluctant to be tested. A Centers for Disease Control and Prevention report in 2016 estimated that one out of five people living with HIV were unaware of their status (Centers for Disease Control and Prevention 2016; Price et al. 2019). Similarly, it has been estimated that only 50 percent of women at risk for the BRCA1/2 genetic mutation, which is associated with a substantially increased risk of breast cancer, have been tested (Foster et al. 2004).

Part of the psychology of this type of deliberate ignorance involves the possibility of remediation. There is evidence that when no treatment has been found for a disorder or condition, the severity of the diagnosis is correlated with reluctance to be tested (Dawson et al. 2006). The more severe the disease, the less people want to know whether they have it. As one friend put it to me, "Why should I get tested? There's nothing I can do about it."

Spoiler Alert!

The urge to remain ignorant is not limited to the possibility of dreadful news. It can be fun not to know. Sometimes it's all about the anticipation and surprise. Researchers Gigerenzer and Rocio (2017) found that 40 percent of their German participants would not want to know the sex of their child in advance; 60 percent would not like to know what they are getting for Christmas; 77 percent said that if they had taped a soccer game to watch later, they would not want to be told who won before viewing it (Gigerenzer and Rocio 2017).

The Motives for Not Knowing

Psychologists have identified several motivations for deliberate ignorance (Gigerenzer and Rocio 2017; Hertwig and Engel 2016). Four of the most important are:

1. **Avoiding the negative emotions**

associated with foreknowledge of negative events, for example in the Huntington's Disease case.

2. **Maintaining suspense and surprise**, as in the taped soccer game case.
3. **Gaining strategic advantage**. In some negotiations, it can be advantageous not to know how costly it would be for negotiations to break down. In other cases, deliberately remaining ignorant can be a strategy for avoiding responsibility (think used car salesperson). Similarly, despite the fact that gun violence is exceptionally high in the United States, for a quarter of a century Congress, led by conservative politicians, prohibited the funding of research on the topic (Stolberg 2021).
4. **To achieve fairness and impartiality**. This motivation explains why some musical auditions are done behind a curtain to avoid the musician's age, race, or gender influencing the judges; why some college professors use a coding system on term papers to prevent them from knowing whose paper they are grading; and why scientists use double-blind experiments.

The last three cases are more obviously rational. We may have some moral concerns about the used car salesmen who deliberately fails to evaluate the brakes on the car, but we understand the strategy. Similarly, not everyone prefers surprise—I chose to know the sex of my children ahead of birth—but it is both rational and morally sound to hate spoilers and savor anticipation and surprise.

In general, the most ambiguous cases involve avoiding the negative emotions that might result from knowing. There is nothing wrong with avoiding unhappiness and seeking joy, but the choice to be knowledgeable or ignorant can have practical implications. In these cases, the rationality of the decision is more ambiguous.

Setting aside the emotional burden of knowing you have an incurable disease, getting tested for a genetic disorder can have health consequences for both the individual and his or her biological children. We now know without need of genetic testing that Arlo Guthrie was spared the HD gene. He is seventy-three years old and has only recently announced his retirement from touring (Rogers 2020). Nonetheless, when he was younger, before the test was available, he fathered four children. In his radio interview, Guthrie justified this decision by arguing that all life is valuable, even a short life. Of course, we now know his children are not at risk, but some people in Arlo's position might have chosen not to have children. Furthermore, now that a test is available, having children while remaining ignorant of your genetic status carries a different moral weight. One could hardly criticize the person at risk for HD who chooses not to get tested but also avoids having biological children. Not everyone will want to carry the burden of knowing for certain that they will develop HD. But many people would judge the decision differently if, today, a person at risk for HD chose to have children without the benefit of knowing his or her genetic status. Similarly, despite the fact that there are effective treatments for HIV, engaging in risky behavior without knowing your HIV status might also be unwise. The CDC recommends that sexually active gay and bisexual men be tested every three to six months (Centers for Disease Control and Prevention 2021).

It is a fascinating psychological fact that if it were possible to find out when you will die, most people would choose not to know. Ignorance in this case might not be blissful, but for many people it would be preferable to certain knowledge. Furthermore, the choice to

Arlo Guthrie performing on the Guthrie Family Tour, May 2, 2007. Credit: Wikimedia.

remain ignorant would not be entirely irrational. But scientific advances have created new and sometimes difficult dilemmas about knowledge and ignorance. For millennia, parents never knew what sex their child would be at birth and, as a result, were forced to hang on to suspense and uncertainty until the baby arrived. Today, parents have the choice to know in advance, a development that has made possible the somewhat questionable cultural phenomenon of the "gender reveal celebration"—something that only came to my attention this past September when pyrotechnics used at such an event in California set off a wildfire that eventually burned more than 20,000 acres (Morales and Waller 2020).

But, setting aside fire safety issues, medical testing has made some decisions about whether or not to remain ignorant much more consequential—both for the individual and for others. It's easier to determine what's rational when buying a house or a used car, but when the information available is for an untreatable medical condition, the rational path is less obvious. As a result, deliberate ignorance is a topic that is likely to keep philosophers and psychologists busy for a long time. ■

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[THE PRACTICAL SKEPTIC MICK WEST

Mick West, a writer and investigator, is the creator of the Metabunk.org website and author of *Escaping the Rabbit Hole*. He is a Committee for Skeptical Inquiry fellow.

UFOs: Beliefs, Conspiracies, and Aliens

Editor's note: With this issue we are pleased to welcome a new regular columnist, writer and investigator (and CSI Fellow) Mick West, creator of the Metabunk.org website and author of Escaping the Rabbit Hole.

You might not think of the topic of UFOs as being a conspiracy theory. After all, who is allegedly conspiring? Are aliens plotting to buzz people on isolated roads in the middle of the night or to hover just beyond camera distance near U.S. Navy battle groups? UFOlogists (people who study UFOs) will dismiss talk of conspiracy and tell you their interest is purely scientific—there are unidentified objects in the sky, and they are trying to figure out what they are.

But interest in UFOs (a.k.a. unidentified aerial phenomena, or UAPs) almost invariably comes along with some kind of conspiracy theory. To understand why, we must look at the other unspoken belief (or at least exceedingly strong suspicion) that UFOlogists have: that UFOs are related to aliens—creatures from another planet.

"Who mentioned aliens?" is a common refrain when I mention aliens, often followed by something like: "Nobody said aliens but you. Why are you trying to discredit UFOs by associating them with aliens?" This kneejerk response to the word *aliens* is a reaction to the perceived stigma associated with being a believer in visiting extraterrestrials. Coverage of UFOs, even now in the middle of a firestorm of high-level publicity, has always been accompanied in the media by chuckles, raised eyebrows, tones of strained credulity, and jokes about little green men and alien probes.

UFOlogists recognize this, and some try to focus instead on a "science"- or "national security"–based take on the topic. There are, they claim, proven craft flying around in the air at speeds and accelerations impossible with current human technology. They are not saying it's aliens, but should we not look into it? We might learn something, and the UFOs might be dangerous.

Former U.S. Senator Harry Reid took this tack when he wrote about what stirred his interest in the topic,

starting twenty-five years ago (Reid 2021):

> One day in 1996, I received a call from George Knapp. … "Harry," he said, "there's something you have to attend." He invited me to an upcoming conference that would focus on what the U.S. government generally refers to as "unidentified aerial phenomena," but what most other people simply call U.F.O.s.
>
> … A large conference room at the event was filled with academics, interested members of the public and, yes, a few oddballs. I was very impressed with the academics, who spoke of unidentified aerial phenomena in the language of science, discussing the issue in terms of technological advancement and national security. I was hooked.

A savvy politician, Reid is quite explicit in distancing himself from the "few oddballs" and from conspiracies:

> I believe it's crucial to lead with the science when studying U.F.O.s. Focusing on little green men or conspiracy theories won't get us far. Of course, whatever the science tells us, some portion of the public will continue to believe in the reality of otherworldly UFOs as a matter of faith. Ultimately, the UFO debate can be broken down into a sincere belief in science versus a sincere belief in extraterrestrials. I side with science.

Despite being ostensibly level-headed, Reid's UFOlogy origin story and subsequent actions veer directly into alien territory. His friend George Knapp was (and still is) very much a believer in aliens, having built a considerable segment of his career in promoting the claims of Area 51 confabulator Bob Lazar as factual. Lazar claims to have worked on and even flown actual alien flying saucers. Another friend of Reid is Robert Bigelow, a millionaire motel mogul who pivoted later in life into aerospace and the study of UFOs and the paranormal (Scoles 2018). Bigelow is very much a believer in alien visitors. When asked about them in 2017, he said "There has been and there is an existing presence, an E.T. presence. … You don't have to go anywhere. … It's just, like, right under people's noses."

Harry Reid went on to create the small government program called the Advanced Aerospace Threat Identification Program (AATIP). Ostensibly, this was to study possible developments in aerospace technology over the next few decades. Behind the scenes, the program included some studies of UFOs with the assumption that they represented alien technology from which we could learn. The Pentagon put the program out to tender. One person applied and was awarded the $22 million contract; that person was Reid's friend Robert Bigelow (Bender 2021).

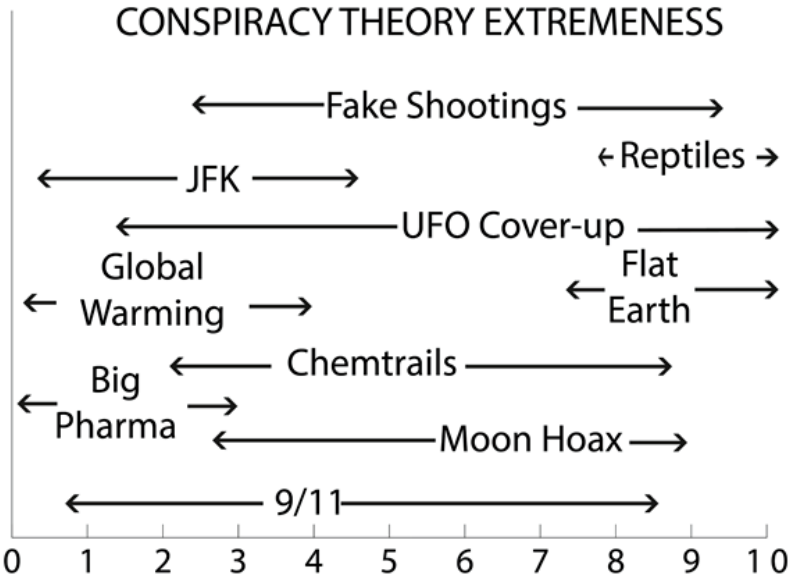

Figure 1. The Conspiracy Theory Extremeness Spectrum

Reid and Bigelow's program largely fizzled out after five years, but it seems to have inspired a new generation. One of the most vocal current voices in UFOlogy, Luis Elizondo, who had a somewhat unclear involvement with AATIP and Reid, resigned from the Pentagon in 2017 and improbably joined forces with Tom DeLong (of the band Blink-182), Chris Mellon (a former deputy assistant secretary of defense for intelligence), and others to form the To the Stars Academy to investigate and promote UAPs.

DeLonge has had long, eccentric, and vocal support for the ET hypothesis. Elizondo and Mellon were initially somewhat more restrained, but in the second season of their History Channel show *Unidentified: Inside America's UFO Investigation*, both expressed strong suspicion that it might be something like aliens. Elizondo stated in June 2021 that UFOs might come "from outer space, from inner space, or from the space in-between." Mellon said a month earlier that "ET/UT" (extraterrestrials or ultraterrestrials) were, in his mind, a probable explanation for some UFO encounters.

Who is saying UFOs might be aliens? *Everyone is.*

The Conspiracy Spectrum

In my book *Escaping the Rabbit Hole*, I explained that conspiracy theories exist on a spectrum. There are mundane theories, such as politicians being bribed or corporate corruption. Then we move to more extreme theories, such as the U.S. government being responsible for planning 9/11 or spraying "chemtrails" on us from high-flying planes. At the far end of the spectrum, we get the fantastical theories, such as flat-earth or shape-shifting child-eating lizards ruling the planet. I drew a somewhat *ad hoc* diagram to reflect this range (see Figure 1).

Any given labeled conspiracy does not simply sit at one position in the spectrum. They each span a range of extremeness for that individual theory. Chemtrails, for example, range from a two (secret modifications to jet fuel to increase cloudiness to help with global warming) to a nine (government spraying nanobots to take over our brains).

The theory with the widest spread is the "UFO cover-up" theory, going from one to ten. This spread was something I was not entirely sure of at the time, because I had done only basic research into the topic. But subsequent events, the research those events prompted, and the people I have talked to have all borne out the assessment of UFOs as a full-spectrum conspiracy theory.

Before we dive into that spectrum, I want to explain why understanding is essential. It's all about communication. Effective communication requires an accurate shared understanding even when there is disagreement. It is very tempting to put a label on someone and then either dismiss or attack them based on some preconceived notion of what that label means. If you think UFO enthusiasts are obsessed with abductions and crop circles when they are actually just thinking the government is experimenting with technology from a recovered flying saucer, then you will not have a productive conversation. Conversely, if they think UFOs are angelic beings from another dimension, then talking about the Drake equation, or the absence of sonic booms, is unlikely to make much of an impact. We need to figure out where we all are on the spectrum so we don't end up talking past each other.

Understanding the spectrum is essential in understanding what has been going on in recent months with the government's UAP task force, the leaked videos, and the expectations of, and reaction to, the UAP report that was released in June 2021. Each individual will react differently based on where they are on the UFO conspiracy spectrum.

Let's start at the mundane end. Ranking somewhere between zero and one is the simple idea that the government (and here we generally focus on the U.S. government) has some evidence of anomalous objects, does not fully understand what that evidence shows, and is very loosely conspiring to cover up the fact that they don't know. This simple barely-a-conspiracy theory is generally what many UFO enthusiasts profess to believe. No mention is made of aliens. There's no need to even invoke much in the way of nefarious intent, beyond an unwillingness of the government to admit its failings. There's a simple, almost benign puzzle (what are UFOs?) that they feel is just not getting the attention it deserves.

But the stakes rapidly escalate for the majority of UFO enthusiasts. Most, in my experience, believe that "the phenomenon" (an overinclusive term that in reality covers a panoply of diverse and largely unconnected events) has been going on for seventy or more years. The government has had ample opportunity over those years to gather data. So the conspiracy becomes a more fully fledged cover-up. The government allegedly knows that UFOs are "real" but won't tell the public.

What the government knows and is conspiring to keep from us varies by individual. Many think that the government has recovered material from a crashed alien craft. Roswell springs to mind, but we also have the tale told by Bob Lazar of how multiple flying saucers were recovered at an archaeological site and were being experimented with (and flown) at Area 51. We are now coming toward the middle of the UFO conspiracy spectrum. More extreme—but still not the most extreme—are the theories of a cover-up of actual alien contact: alien bodies were possibly recovered from crashed saucers, autopsies were allegedly performed. Live aliens have been rumored to exist, perhaps in secret underground military bases.

Then there are the *really* extraordinary beliefs—so extraordinary that it seems incongruous to talk about them in the same breath as a government cover-up. Some posit alien abductions happen regularly to thousands, if not millions, of people who are spirited away from their beds, examined, implanted, and returned with no trace it ever happened. It seems impossible for the government *not* to be aware this is happening. Yet it seems equally improbable that they would be able to cover it up.

Finally, we delve into the mystical and the metaphysical. UFOs are angels or demons. The conspiracy cover-up is because the military is afraid of provoking the demons (Colavito 2021). Or they are not precisely aliens in the traditional sense but some kind of interdimensional entity, "ultraterrestrials" (secretive magical creatures from Earth) or even time-traveling humans, possibly tourists. In more imaginative interpretations, many UFO sightings are faked by interdimensional travelers to cover up their presence. In this case, the aliens *are* the ones who are conspiring.

What the government knows and is conspiring to keep from us varies by individual. Many think that the government has recovered material from a crashed alien craft.

As a skeptic, I often talk to people who have beliefs I think are wrong, and I try to help them see the truth. It is vitally important when we make such an attempt that we ensure we understand what they believe—and how extreme that belief is—before wading in with facts and logic. This understanding is essential when dealing with new information, such as the government's UFO report. It contains no evidence of aliens, and that absence will be taken by many as evidence of conspiracy. To have a useful conversation about this, you need to understand *which* conspiracy. ■

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[SKEPTICAL INQUIREE BENJAMIN RADFORD

Benjamin Radford is a research fellow at the Committee for Skeptical Inquiry and author or coauthor of thirteen books, including *Big—If True: Adventures in Oddity*.

How to Sort Falling Frogs

Q: **How does a tornado explain the finding of a single species in some falls of frogs? Surely, the aerodynamics of the lift might sort for weight but not for species and genus.**

—L. Coleman

A: For millennia, people have reported a rare and strange phenomenon: a sudden rain of frogs—or fish or worms—from the sky. You may be minding your own business walking in a park on a blustery day when a small frog hits you on the top of your head. As you peer down at the stunned animal, another one comes down, and then another and another all around you, in a surreal rain of frogs in various states of trauma.

The most likely explanation for how small frogs get up into the sky in the first place is meteorological: a whirlwind, tornado, or other natural phenomenon. Mystery-mongering curiosity collector Charles Fort admitted that this is a possibility but offered several reasons he doubted that's the true or complete explanation in his 1919 *The Book of the Damned*:

> It is so easy to say that small frogs that have fallen from the sky had been scooped up by a whirlwind … but [this explanation offers] no regard for mud, debris from the bottom of a pond, floating vegetation, loose things from the shores—but a precise picking out of the frogs only. … Also, a pond going up would be quite as interesting as frogs coming down. Whirlwinds we read of over and over—but where and what whirlwind? It seems to me that anybody who had lost a pond would be heard from.

Of course frogs and fish do not live in the sky, nor do they suddenly and mysteriously appear there; in fact, they

share a common habitat: ponds and streams. It's certain that they gained altitude in a natural, not supernatural, way. That there are very few eyewitness accounts of frogs and fish being sucked up into the sky during a tornado, whirlwind, or storm is hardly mysterious. Anytime winds are powerful enough to suck up fish, frogs, leaves, dirt, and detritus, they are powerful enough to be of concern to potential eyewitnesses. In other words, people who would be close enough to a whirlwind or tornado to see the fearful flying amphibians would be too concerned for their own safety to pay much attention to whether or not some frogs are among the stuff being picked up and flown around at high speeds. These storms are loud, windy, chaotic, and hardly ideal for accurate eyewitness reporting.

Artwork by Celestia Ward

The same applies to Fort's apparent surprise that, following frog falls, farmers or others don't come forward to identify the specific pond the frogs came from. How would anyone know, and why would they care? Whirlwinds and tornadoes may move quickly and over many miles, destroying and lifting myriad debris in its wake. Unless a farmer took an inventory of all the little frogs in a pond both before and after a storm, there's no way anyone would know exactly where the frogs came from. Neither would it be noteworthy.

Which brings me to the question above: How *does* a tornado explain finding a single species in some frog falls? The first thing to note, of course, is that before we try to explain something we should be sure that there is indeed something to explain. In this case the writer has asserted, without any supporting evidence or documentation, that some falls of frogs contain only "a single species." If that is not true—if it is a mistake, for example, or mere rumor or legend—then we need not spend considerable time trying to explain how that could happen.

But the claim does not seem unreasonable, and I'm perfectly willing to concede that it's possible that in at least a few frog falls only one species of frog was found. Of course, I'd like to know who did the investigation (a herpetologist? a farmer? a little boy who said he only saw one kind of frog?) and what the methods were (How big an area did the person survey to determine how many species of frogs were found? A few feet? A few yards? A mile? If it were a forested or urban area, did he or she search treetops and rooftops for smaller frogs that might have been trapped up there and not made it to the ground, or did the person only count the frogs nearby?). As long as we're looking at this from a scientific perspective, I'd also be curious about how the determination of single-species frog dispensing was made. Different species of frogs may look alike, have similar colors, or be unidentifiable because of injury from falling from a great height; did the person reporting the data have the frogs collected, catalogued, and identified by a biologist to conclusively determine that only one species fell?

I would argue that the evidence for single-species frog falls—however plausible—is far from definitive because of a dearth of information about how the data was collected. Rumors and third-hand information are routinely cited in the Fortean literature as self-evident truth and established fact.

These questions aside, the most likely answer is that the ponds and rivers that were the source of the frogs had only one species in them to begin with. Unless we know that the waters over which those tornados and whirlwinds travel have multiple species of frogs in them, there doesn't seem to be much mystery to the fact that only one species may sometimes be found picked up in them. It's entirely plausible that a whirlwind or tornado (especially one confined to a localized area of a few miles) might cross over only one river, stream, or lake during its time and pick up only one species of frog.

The comment that "the aerodynamics of the lift might sort for weight, but not for species and genus" is a non sequitur, because weight is a function of genus and species. Some species of frogs (just like some species of any animal) are larger and heavier than other species. I am not an expert on frogs and do not claim to be, but it seems that the statement would be valid only if all genus and species of frogs in a given location had equal mass and weight and were therefore equally likely to be picked up by a passing whirlwind or tornado, all else being equal. Frog falls are weird and rare but hardly unexplainable, and neither is the fact—if indeed it is a fact—that they may affect a single species. And that's a falling frog fact. ■

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How to Keep Your Mind on Solid Ground during the Latest UFO Excitement

UFOs are trending again. Here's how to stay grounded.

GUY P. HARRISON

Look to the skies! UFOs are trending again! In recent months, UFO interest has gained sufficient altitude to escape not only the immense gravity wells of Facebook and Twitter but even that dark credibility vacuum known as The History Channel. Serious though incomplete reporting has appeared in mainstream news media, including The New York Times, USA Today (Shannon 2021), the Associated Press (Finley 2019), and 60 Minutes (Whittaker 2021), while politicians have made stern-faced comments about threats to national security (Rosenwald 2021). Former U.S. Navy pilots—backed up by videos—appeared on 60 Minutes to describe being stumped after strange in-flight experiences. And then there is Harvard theoretical physicist Avi Loeb, who strongly suggests—if not outright declares—that passing interstellar object 1I/2017 U1 ('Oumuamua) is an extraterrestrial spaceship (Billings 2021; Ahmed 2021).

So, what does all this smoke and noise mean? Not much, it turns out.

As a result of inadequate reporting that neglected to include sufficient scientific perspective, many people now seem to believe that the U.S. military has confirmed the existence of extraterrestrial visitors—or is at least closing in on proof. But this is not the case, of course. UFOs (some call them UAPs, "unidentified arial phenomena") are not spaceships necessarily. Why would de-

claring that UFOs/UAPs are "real" be considered major news? By definition, a UFO/UAP is a mysterious blur, blip, or fuzzy dot. Didn't everyone already understand that there are things in the sky that defy immediate identification? Moreover, there is nothing substantially new or controversial about the U.S. military being concerned about unidentified airborne objects and investigating them within reason. What is clear is that despite the flurry of news coverage, the status quo remains unchanged. The U.S. military has not confirmed the existence of extraterrestrial vehicles of any kind, and no direct evidence for one has been presented by anyone.

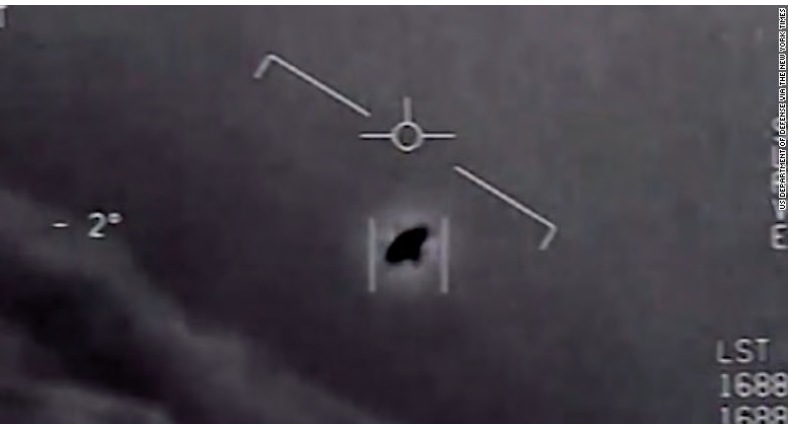
Regarding excitement about 'Oumuamua, Harvard astrophysicist Loeb has not made a convincing case for it being an interstellar spaceship or derelict machinery from a distant civilization. His book *Extraterrestrial: The First Sign of Intelligent Life Beyond Earth*, stumbled out of the gate because that subtitle could have worked only with a question mark. As a statement of fact it fails, as does this line from the publisher's description of the book: "There was only one conceivable explanation: the object was a piece of advanced technology created by a distant alien civilization" (Loeb 2021). 'Oumuamua is certainly fascinating and worthy of study. It came from *somewhere else* and accelerated while passing through our neighborhood. But there are explanations for it that not only are conceivable but more likely to be true (Plait 2020). For example, the acceleration might be explained by "outgassing," a natural phenomenon that occurs when gaseous material is expelled from the surface of an object (Davis 2018). "Assertions that 'Oumuamua may be artificial are not justified," wrote the authors of a comprehensive study published in *Nature Astronomy*, the top-ranked journal of astronomy and astrophysics ('Oumuamua ISSI Team 2019). (Also see "Interstellar Visitor: The Strange Asteroid from a Faraway System," SI, March/April 2018.)

Are Aliens Us?

If the latest intriguing stories and images are not the result of simple perception errors or confusing camera/sensor data, perhaps human aircraft is the explanation. My book *50 Popular Beliefs That People Think Are True*, published in 2012, includes a chapter on UFOs. In it I predicted that UFO sightings and interest would surge in the coming years because of the explosive global growth of drones, or UAVs (uncrewed aerial vehicles). Many nations and companies have been investing significant money and engineering talent into this field for years. As a result, there is now a remarkable diversity of UAVs, many of which look quite different from conventional airplanes. Some can do things common aircraft cannot. DARPA, for example, has developed and tested the super-sleek triangular-shaped Falcon HTV-2. This "hypersonic cruise vehicle" can fly in the atmosphere at astonishing speeds of up to Mach 22, approximately 14,000 mph (Erbland n.d.).

Perhaps more relevant to UFO sightings than raw speed is the maneuverability of high-performance UAVs. Unrestrained by the presence of fragile human pilots with squishy brains prone to blackouts, UAVs can be pushed to the limits of power-weight ratios and fuselage/wing strength. It is likely that some cutting-edge and still-secret UAVs can accelerate, decelerate, and maneuver in ways that virtually every human

Conceptual rendering of 'Oumuamua. Credit: NASA/JPL.



Screen shot of a U.S. Navy UAP. Credit: US Navy/DOD.

on Earth—including most military pilots and radar/sensor personnel—are not yet familiar with. I also pointed out years ago that some advanced UAVs are surprisingly small, even insect-sized. This presents another layer of potential confusion for observers trying to assess distance, speed, and identity.

Do Astronomers Hate ET?

Many UFO enthusiasts seem to have strawman fallacy factories somewhere inside their brains, because they repeatedly describe the scientific community as being obtuse and closed-minded about aliens. This does not seem accurate given how many scientists have written books and gone on record in interviews about their enthusiasm for the possibility of life beyond Earth. I have endured close encounters with some of the most boring conservative-minded scientists imaginable, and even they brightened up in reaction to questions about extraterrestrial life. I have visited SETI headquarters in Mountain View, California—tangible evidence that science is curious. I have interviewed and chatted with many professional scientists in several disciplines relevant to this topic, and none of them were irrationally opposed to the idea of alien life. The only hitch when it comes to UFOs is that good scientists recognize the absence of strong data and will not presume to know what they do not know. They understand that amazing things are possible but resist jumping ahead of available evidence—as we all should.

Keeping the following brief points in mind can help all of us stay intellectually grounded when assessing news about UFOs:

• "Unidentified"—the U in UFO and UAP—does not mean alien spacecraft. "Unexplained" is not an explanation.

• UFO enthusiasts often suggest that the integrity, sincerity, or mental state of a witness is unfairly assaulted when a claim is met with skepticism. This tactic is either uninformed or dishonest because skeptics consistently and continually explain that to some degree everyone is vulnerable to illusions and misinterpretations—no deceit or insanity required (Harrison 2013).

• We do not see the world around us in full or as it really is. Our eyes receive reflected light from objects, and then our brains do rapid translations or reconstructions of that information to present us with a manufactured and highly edited scene that we "see" in our minds. Human vision is often unreliable, as has been confirmed by numerous experiments (Harrison 2015).

• Beliefs influence perception. Those who believe in ghosts prior to entering a dark and creepy house are more likely to "see" and "hear" ghosts than those who did not hold that prior belief. Some UFO sightings are likely the result of beliefs coloring the experience (Harrison 2013).

• Remember that human memory is imperfect and unreliable. Our brain is not an organic video/audio recording and playback system. The brain retrieves bits of information from past experiences, stiches them together, and then *tells us a story* about the past that is meant to be useful in the present. Given all that science has revealed about how poorly we remember, it makes no sense to trust anyone's recollection of seeing an extraterrestrial spaceship last year, last week, or five minutes ago. For something so unusual and important, we need much more than eyewitness accounts to make the case (Harrison 2015).

Given all that science has revealed about how poorly we remember, it makes no sense to trust anyone's recollection of seeing an extraterrestrial spaceship.

• One often hears about a UFO flying in ways that "defy physics." Such claims mean little because few people understand physics. Mass in motion, particularly in the sky or space, may behave in ways that are counterintuitive and surprising to most people. Ignorance about physics, mixed with standard vision or memory errors, make a potent recipe for UFO confusion.

• The expertise of a witness is close to irrelevant. Commercial airline and military pilots may be only marginally better than anyone else when it comes to accurately observing and remembering UFO sightings, because they too must rely on a human brain that is highly susceptible to error.

• It is surprisingly easy for an observer to misinterpret the speed and direction of a flying object when observed from some angles. Mick West, author of *Escaping the Rabbit Hole*, explains this well on his website MetaBunk.org.

• Radar and other sensing systems used by militaries are not infallible. Their output may be inaccurate if they are faulty, not properly calibrated, or tasked to do something they were not designed to do. And, of course, data are always subject to misinterpretation by human minds.

Skipping past "unidentified" to land on "aliens" is sloppy, unscientific thinking. There is work to be done between unknown and known. Why are aliens the default answer, anyway? Why aren't more UFO sightings and grainy black-and-white videos interpreted as ghosts or airborne witches? If witches exist, it means they are already here and don't have

to solve the hard problem of interstellar travel. Their brooms are reputed to be airworthy, and no one has proved that open UFO cases are *not* witches. Come to think of it, how can we be sure that Bigfoot is not winged and capable of flight? The bottom line is that if an unidentified blur, light, or dot can be aliens, then it can be anything.

I am neither intellectually nor emotionally opposed to extraterrestrial visitation. I'm all for it. If they ever land in my city, I will be the guy elbowing his way past and outrunning every UFO buff for the chance to make first contact. I would love for the universe to include one or many *Star Wars* galaxies filled with countless cultures and high drama. I hope for a *Star Trek* future in which we work and play well with intelligent species throughout the Milky Way. But I am not so eager that I am willing to surrender my intellectual integrity and clutter my mind with fool's gold to get there.

It is in our self-interest to be responsible thinkers and police our thoughts as best we can. This means pausing to doubt and analyze when faced with important claims—especially those we would love to be true. Thinking before believing is prudent and wise because it leaves more time and brain power for the real stuff. Dedicating ourselves to the principles of scientific reason rewards us not only with useful knowledge of the world around us but also leads us in the direction of enough true beauty and wonder to fill a universe. ■

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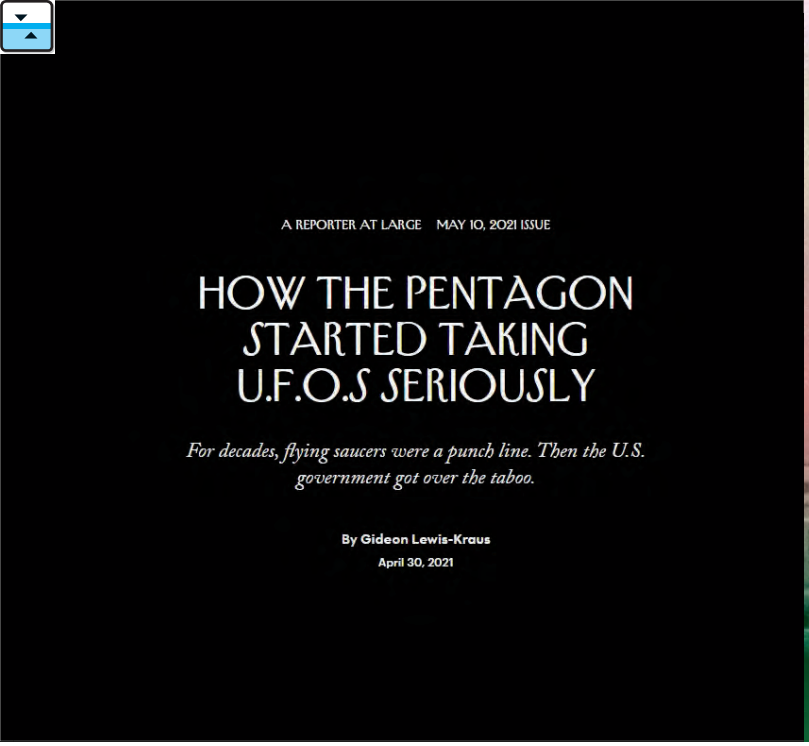
A REPORTER AT LARGE MAY 10, 2021 ISSUE
HOW THE PENTAGON STARTED TAKING U.F.O.S SERIOUSLY
For decades, flying saucers were a punch line. Then the U.S. government got over the taboo.
By Gideon Lewis-Kraus
April 30, 2021

The New Yorker's Credulous Article on Pentagon UFOs

ROBERT SHEAFFER

On April 30, the normally serious *New Yorker* dropped online a very misleading article titled "How the Pentagon Started Taking U.F.O.s Seriously." (UFO author Leslie Kean said that work on this story "has been underway for months," which is quite surprising!) The article appeared in the May 10 printed edition of the *New Yorker* under the title "The U.F.O. Papers."

This article, by Gideon Lewis-Kraus, boldly begins, "On May 9, 2001, Steven M. Greer took to the lectern at the National Press Club, in Washington, D.C., in pursuit of the truth about unidentified flying objects." *In pursuit of the truth, no less!* Because Lewis-Kraus had only a few months to research this article, he apparently had no opportunity to learn that serious UFOlogists, both skeptic and otherwise, consider Greer a yarn-spinning money grubber whose credibility is zilch. Greer once even claimed to have an "alien familiar" named Bijoux.

After recounting the exploits of the mighty Dr. Greer, still in pursuit of the truth, we learn, "Among the other speakers was Clifford Stone, a retired Army sergeant, who purported to have visited crash sites and seen aliens, both dead and alive. Stone said that he had catalogued fifty-seven species, many of them humanoid." Again, in his apparent rush to prepare the article, Lewis-Kraus didn't have time to discover that the wild tales of Clifford Stone are soundly rejected by most serious UFO researchers.

The principal hagiography in this piece is that of Leslie Kean. Lewis-Kraus portrays Kean as "stand[ing] apart from the ufological mainstream," which is pure bollocks. Kean is down in the UFOlogical mud, wrestling with the rest of us. She has a best-selling book from 2010, *UFOs: Generals, Pilots, and Government Officials Go on the Record*, whose credibility—like that of most UFO books—is pretty bad. He tells us that Kean's apartment is "a tranquil space decorated with a Burmese Buddha and bowls of pearlescent seashells."

Lewis-Kraus mentions only in passing that Kean's "latest project examines the controversial scholarship on the possibility of consciousness after death." Actually, it's much worse than that: Kean has gone full woo-woo on the subject of ghosts and spirit manifestations. She insists that she has "absolutely no doubt, not one iota," that a spirit manifested and touched her while she was attending a seance:

> In May, 2019, I experienced a full form materialization in a seance with Stewart [Alexander]. His communicator Dr. Barnett, who normally speaks in independent voice, walked out of the cabinet, stood in front of me and touched my hair. He then placed both his large hands on top of my head, bouncing them up and down for about a minute and a half. (That's a long time). These were solid "living" hands. He spoke in his recognizable voice. "I just wanted to let you know that I am a solid human being," he said. He then returned to the cabinet and disappeared.

We read how Kean's intense interest in UFOs began in 1999 when she was sent a copy of a ninety-page French report

referred to as COMETA. Because the report was prepared by "a dozen retired French generals, scientists, and space experts," Kean "was certain … that anyone given access to the French report's data and conclusions would understand why she had dropped everything else." (They didn't.) Others, more experienced in the crazy world of UFOlogy, reached other conclusions. John Alexander, who was involved in Pentagon ESP experiments and is surely no skeptic, described the COMETA report as "an embarrassment … unsubstantiated data from questionable sources" in his book *UFOs Myths, Conspiracies, and Realities* (218–20). No such doubts occurred to Kean, who seems quite certain that the government is hiding something really big from us concerning UFOs, although she professes (a bit disingenuously) to be agnostic on the question of whether they are extraterrestrial.

In this very long article, Lewis-Kraus tries to give us a summary of UFOlogy's Greatest Hits, its Golden Oldies, such as the airship sightings of 1896–1897; Kenneth Arnold; the Washington, D.C., incidents of 1952; the Robertson Panel; J. Allen Hynek; the Condon Report; and so on. I guess the purpose of all this is to show that UFO sightings and UFO controversies have been around for a long time.

Having given us a crash course in UFO history, author Lewis-Kraus returns to his hagiography of Kean:

> Once it was clear that U.F.O.s were going to be her life's work, Kean resolved to ally herself with the research tradition that Hynek had pioneered. Ufologists liked to dwell on certain historic encounters, like Roswell, where any solid evidence that might once have existed had become hopelessly entangled with mythology. Kean chose to focus on "the really good cases" that had been reported since the close of Blue Book, including those that involved professional observers, such as pilots, and ideally multiple witnesses; those that had been substantiated with photos or radar tracks; and especially those in which experts had eliminated other interpretations.

The first such "really good" case mentioned is the famous Rendlesham case in Suffolk, United Kingdom, in December 1980 (which the late James Moseley always referred to as "Rendle-sham").

> The details of the incident as it is described in Kean's book are sensational, to say the least. Another witness, Sergeant James Penniston, said that he got close enough to a silent triangular craft to feel its electric charge and to note the hieroglyphic-like designs etched into its surface.

The *claims* associated with Rendle-sham may well be "sensational," but the *facts* are decidedly less so. I have already described some of the many absurdities claimed about this case. As for Penniston, he claims that he touched the landed UFO and received a message from it in the form of a "binary code," which he subsequently wrote down. However, he did not tell anyone about it for thirty years. (Highly publicized UFO cases, like fine wines, often improve with age.) Penniston now says that the binary data from the Rendle-sham UFO was sent by time travelers. Remember: this is a "really good case," unlike all those other flakey ones.

Later on, Lewis-Kraus tells us,

> One dogged British researcher has convincingly shown that the Rendlesham case, or Britain's Roswell, probably consisted of a concatenation of a meteor, a lighthouse perceived through woods and fog, and the uncanny sounds made by a muntjac deer. Eyewitness reports are subject to considerable embroidery over time, and strings of improbable coincidences can easily be rendered into an occult pattern by a human mind prone to misapprehension and eager for meaning. The researcher had exhaustively demystified the case, and I was perturbed to learn that Kean seemed unfazed by his verdict. When I asked her about it, she did little more than shrug, as though to suggest that such fluky accounts violated Occam's razor.

He doesn't want to tell us the British researcher's name; it is Ian Ridpath. Nor does he give us the URL that "exhaustively demystified the case"; it is at http://www.ianridpath.com/ufo/rendlesham.html. Mustn't give skepticism too much of a boost. Or upset Kean! So much for "journalistic objectivity"! Obviously wavering in The Faith, at least a little, he asked Kean about it:

> Even if Rendlesham was "complex," she said, it was still "one of the top ten U.F.O. encounters of all time." And, besides, there were always other cases. Hynek, in "The UFO Experience," had contended that U.F.O. sightings represented a phenomenon that had to be taken in aggregate—hundreds upon hundreds of incredible stories told by credible people.

So even if the Rendle-sham case has a logical explanation, it is nonetheless a "top ten" UFO case, a Golden Oldie, so that counts for something, I guess. And here she repeats Hynek's "bundle of sticks" analogy, which I heard him make many times: any one stick might be broken, but taken together they are too strong to break. To which the obvious reply is: If each case is a zero, the sum of any number of zeroes is zero.

For another "really good" case,

> Kean selected an incident that occurred in Kecksburg, Pennsylvania, a rural hamlet southeast of Pittsburgh, on December 9, 1965, in which an object the size of a Volkswagen Beetle allegedly hurtled from the sky. According to multiple witnesses, the acorn-shaped bulk had been removed from the woods on a flatbed truck as service members guarded the area with guns.

Allegedly. The problem is, we know *exactly* what people saw in the sky near Kecksburg—and indeed across the entire region. It was the Great Lakes Fireball of December 9, 1965, well documented in *Sky and Telescope* magazine (February 1966) and other astronomical publications. This has been pointed out repeatedly by skeptics for decades, but somehow the word doesn't seem to have reached Kean. She lives in a bubble of overwhelmingly pro-UFO information and apparently thinks that there is nothing of value outside it. As for the claims about soldiers in the woods recovering a crashed UFO, as I said about Rendle-sham, highly-publicized UFO cases, like fine wines, often improve with age.

Lewis-Kraus Continues,

> Kean's book, which was praised by the theoretical physicist Michio Kaku as "the gold standard for U.F.O. research," and to which John Podesta had contributed a foreword,

> enhanced and expanded her influence. In June of 2011, Podesta invited Kean to make a confidential presentation at a think tank he founded, the Center for American Progress. … In August, 2014, Kean visited the West Wing to meet again with Podesta, who was by then an adviser to President Obama. She had scaled down her request, proposing that a single individual in the Office of Science and Technology Policy be assigned to handle the issue. Nothing came of it.

What we are not told is that Michio Kaku is a UFO believer who has warned about possible alien invasions and such. His book *Physics of the Impossible*, deals with the supposed physics of "phasers, force fields, teleportation, and time travel." The great majority of Kaku's colleagues in physics would dismiss this as nonsense.

Now we come to … The Fly! Lewis-Kraus somewhat apologetically writes that Kean

> had a cordial relationship with the Chilean government's Comité de Estudios de Fenómenos Aéreos Anómalos (CEFAA). She had begun breaking stories from its case files with an atypical recklessness. Kean's work from this period, mostly published on the *Huffington Post*, shows signs of agitation and evangelism. In March of 2012, she wrote an article called "UFO Caught on Tape Over Santiago Air Base," which referred to a video provided by CEFAA. Kean described the video as showing "a dome-shaped, flat-bottomed object with no visible means of propulsion … flying at velocities too high to be man-made." She asked, "Is this the case UFO skeptics have been dreading?"

However, the CEFAA video was widely panned—and not just by skeptics—as simply showing a fly buzzing around. (Note that the *Huffington Post* article, coauthored by Ralph Blumenthal, Kean's coauthor of her *New York Times* articles about AATIP and Pentagon UFOs, was updated in 2017—undoubtedly to make it less embarrassing. I was not able to find the original article in the internet archive or anywhere else.) Lewis-Kraus does mention my debunking of the Chilean fly UFO video, again without giving anyone the URL to enable them to check it themselves.

> When Kean wrote about the CEFAA video, debunkers leaped at the chance to point out that the object in the case they had been dreading was in all probability a housefly or a beetle buzzing around the camera lens. Robert Sheaffer, the proprietor of a blog called Bad UFOs, wrote in his column in the *Skeptical Inquirer*, "Indeed, the very fact that a video of a fly doing loops is being cited by some of the world's top UFOlogists as among the best UFO images of all time reveals how utterly lightweight even the best UFO photos and videos are." Kean consulted with four entomologists, who mostly declined to issue a categorical judgment on the matter, and urged patience with CEFAA's ongoing investigation.

Kean still has not admitted that she was fooled by a fly buzzing around. She posted some completely irrelevant pictures of beetles, then tried to pass the buck to certain "entomologists," as if even they could identify the exact species of an insect buzzing around and flying rapid loops in front of the camera, and nothing less renders it "unknown."

One of Leslie Kean's last "really good" cases is the UFO reported over gate C-17 at Chicago's O'Hare field on November 7, 2006. Several employees of United Airlines reported seeing a "strange object hovering just under a cloud bank … the metallic-looking disc was about the size of a quarter or half dollar held at arm's length." Unfortunately, no photographs exist of this supposed "metallic-looking disc" hovering over one of the world's busiest airports in daytime, and nothing showed up on radar. Reportedly, "the suspended disc suddenly shot up at an incredible speed and was gone in less than a second, leaving a crisp, cookie-cutter-like hole in the dense clouds. The opening was approximately the same size as the object, and those directly underneath it could see blue sky visible on the other side." From the article:

> The object hovered for several minutes before accelerating at a severe incline and leaving "an almost perfect circle in the cloud layer where the craft had been," as one anonymous witness subsequently put it. … The F.A.A. claimed that it must have been a "hole-punch cloud"—a cirrocumulus or altocumulus cloud crisply perforated with a circular gap, which occasionally appears in below-freezing temperatures. According to meteorologists whom Kean interviewed, it was

Hole-punch clouds like this one are sometimes mistaken for UFOs/UAP. Credit: H. Raab (User:Vesta) - Own work, Wikipedia

much too warm that day for hole-punch clouds to occur.

Kean's source for this information is a report by NARCAP, a pro-UFO investigative team, showing that temperatures were too high for a hole-punch cloud to form at the reported 1,900-foot elevation of the ceiling, which is probably correct. (Kean has no difficulty referencing investigations by other researchers, so long as their conclusion agrees with hers.) But the low ceiling could easily have been partially obscuring a much higher cloud layer, where a hole-punch cloud could exist because of much lower temperatures. Hole-punch clouds occur in cirrocumulous or altocumulous clouds, approximately 8,000 to 39,000 ft. elevation—not in low clouds at 1,900 feet! Thus, there is no reason to reject the FAA's explanation.

The strangest part of the entire article is what it says about UFO skeptics.

> "An informed skeptic is a very different thing from a debunker on a mission," she wrote to me. "There are many out there who are on a mission to debunk UFOs at all costs. They're not rational and they're not informed." Kean thought that they were blinded by zealotry.

How dare rational people argue against her extraordinary claims? Here Kean's mean streak is on full display, which unfortunately is quite common among UFO zealots. They simply cannot believe that there could possibly be any rational objection to their claims. We read,

> Many U.F.O. debunkers are overtly hostile, but Mick West has a mild, disarming manner, one that only occasionally recalls the performative deference with which an orderly might cajole a patient back into his straitjacket.

Because I have been an active UFO skeptic for over fifty years, a longtime associate of the late King of the Debunkers, Philip J. Klass, and indeed the owner of the website debunker.com, I suppose that the "overtly hostile" people author Gideon Lewis-Kraus is talking about includes me. I don't think of myself as "overtly hostile," and I'm wondering what, exactly, he means by that. For years I've been attending major UFO conferences and have met most of the well-known UFOlogists who attend such things. In fact, I get along quite well with many of them. I haven't gotten into any fistfights and hardly any big arguments. And I wouldn't describe any of the UFO skeptics I know as "overtly hostile," but I suppose that's just my opinion. I am happy to report that most attendees of UFO conferences are able to handle skeptical commentary without melting down—very few of them are as rigid in their UFO evangelism as Leslie Kean. I would say that Kean is clearly one of those UFOologists who is "overtly hostile" to anyone disagreeing with her beliefs, a trait she apparently picked up from her mentor, the late UFO abductionist Budd Hopkins. Hopkins's ex-wife, Carol Rainey, wrote that "In our house, the words 'debunkers' and 'skeptics' were used very much in the way that devout Christians use the words 'unbelievers' and 'the unsaved.'"

I have met Mick West, and I agree that he is a soft-spoken individual. But notice the subtle put-down, comparing his mannerisms to a hospital orderly trying to calm down a crazy person. Lewis-Kraus continues,

> Everything [West] told me was perfectly persuasive, but even an hour on the phone with him left me feeling vaguely demoralized. Morgellons sufferers and chemtrail hysterics, he supposed, would be grateful to be relieved of their baseless fears, just as he had been disburdened of the psychic hazard posed by farmhouse aliens—and he didn't see why U.F.O. advocates should be any different. He seemed unable to envisage that someone might find solace in the decentering prospect that we are not alone in a universe we ultimately know very little about.

So Lewis-Kraus feels "demoralized" talking to West, because people find "solace" in entertaining unsupported beliefs? *Here we have an outright admission by the author that he is seeking not facts about UFO claims but comforting beliefs.* And he commits the logical fallacy of concluding that if there is no valid evidence of ET visitation to earth, we are therefore alone in the universe. What an absurd fallacy! Lewis-Kraus continues,

> During one of my phone calls with Kean—greatly pleasurable distractions that tended to absorb entire afternoons—I mentioned to her that I had been in touch with Mick West. It was the only time I had known her to grow peevish. "If Mick were really interested in this stuff, he wouldn't debunk every single video," she said, almost pityingly. "He would admit that at least some of them are genuinely weird."

Yes indeed. How pleasant and engrossing it is to talk to the exalted Ms. Kean! Lewis-Kraus shows no inclination to challenge anything she says or to consult other sources that contradict her. If he had, he would have encountered Kean's "peevishness" many more times. Here we have a clear admission that the author has tossed journalistic objectivity out the window … and also note that Kean seems to be advocating a sort of "social promotion" for at least a few UFO claims. Mick should give at least a few UFO videos a passing grade, even if they don't deserve it. Just because!

In any case, the important thing to keep in mind when the subject of "Pentagon UFOs" comes up (as it now does so frequently): The Pentagon's AATIP program came into existence not because "the Pentagon" or "the Navy" was concerned about UFOs (or "UAPs", as they prefer). It happened because of Robert Bigelow and Senator Harry Reid (D-NV, who was then the Majority Leader in the U.S. Senate). Reid arranged a sweetheart $22 million government contract for his major campaign contributor Robert Bigelow. Leslie Kean found out about it and coauthored several articles about Pentagon UFOs in the *New York Times*. The rest, as they say, is history.

Drunk history, actually. ■

Robert Sheaffer, a veteran skeptical UFO investigator, is creator of the blog *BadUFOs* (badufos.com), where this article originally appeared. He is a longtime contributor to the Skeptical Inquirer.

sentence stood, much to the woman's shock, as she was
development, as well as his personal identity.
CLOSED: TOKOROA EAST
No, you go: Driving instructor
give way rules change tomorrow.
HOW IT WILL WORK AT AN INTERSECTION NEAR
across the bridge or to get
would ask if I was attention seeking and I
industry boom and higher wages,
chairman Queen was or said sticking with the present system was the best option, because the Queen was "above
What is the name of the Queen's official residence?
What is the Queen's favourite Scottish holiday home?

Two Letters *The New Yorker* Didn't Publish

Many scientists and skeptics expressed concern to us about the *New Yorker* article "The U.F.O. Papers" (in the May 10 printed edition). We know of at least two who submitted letters to the magazine about it. *The New Yorker* didn't publish them, but here they are:

Dear Editors:
As an astronomer, educator, and a Fellow of the Committee for Skeptical Inquiry, I was appalled to read the gullible and one-sided article about UFOs in your May 10 issue. It did not exhibit any of the hallmarks of good journalism for which *The New Yorker* is justly esteemed. The author interviewed mostly "true believers" in the extraterrestrial hypothesis of UFOs and did not bother talking to any of the serious skeptics (easily revealed by a Google search) who have found far more prosaic and "earthbound" explanations for the incidents and images ballyhooed in the piece.

It's as if you published an article on the COVID vaccine in which the author spoke extensively with vaccine opponents and those who think injecting bleach is more effective but did not bother to talk with scientists or doctors at all.

You owe your readers a far more balanced treatment. I suggest you assign one of your writers to cover the Committee for Skeptical Inquiry, an organization of scientists, lawyers, magicians, educators, and investigators who have devoted a significant part of their careers to helping journalists and the rational side of pseudoscientific claims.

Sincerely,
Andrew Fraknoi
Former Executive Director, The Astronomical Society of the Pacific
Currently, Astronomy Professor, Fromm Institute, University of San Francisco
Fellow of the American Astronomical Society

Here we go again! *The Times* in 2017 publishes a notoriously credulous report about UFOs, and now *The New Yorker* doubles down with "The U.F.O. Papers" article (May 10), focusing on the same people, all enthusiasts for UFOs as something truly mysterious. Your article highlights Leslie Kean and presents her as "sensible," but my readings find her to be a credulous, pro-UFO believer. An article truly interested in an informed scientific perspective would not have devoted so much space to dubious claims and stories without mentioning their abundant rebuttals.

The article did devote one page (out of 15) to Mick West and his "mild" UFO-debunking approach, but that was about it for skepticism. A truly balanced article would give equal space to the voluminous skeptical UFO examinations by Robert Sheaffer (BadUFOs website) and the late aerospace journalist Philip J. Klass, who was the world's most informed UFO debunker and is not mentioned at all in this article. And no mention of the two U.S. Air Force studies in the 1990s that clearly explained so many sensational reports.

You quote SETI astronomer Seth Shostak about the likelihood of intelligent life elsewhere but don't quote his view about the high unlikelihood that they could be here ("Aliens There but Not Here," *Skeptical Inquirer*, May/June 2020). And nothing from other prominent astronomer/educators like Andrew Fraknoi or Neil deGrasse Tyson, who could have given scientific perspective. A missed opportunity to inform and educate.

Kendrick Frazier
Albuquerque, New Mexico
(Science writer and editor, Editor, *Skeptical Inquirer:* The Magazine for Science and Reason, skepticalinquirer.org; Co-Editor, *The UFO Invasion* (forty articles examining claims about UFOs, aliens, and Roswell from a critical, scientific perspective), Prometheus Books.

The New Yorker did publish one letter (May 31 issue) by a psychologist referring to Jungian archetypes influencing the UFO narrative. ■

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Restricted Area
It is unlawful to enter this area without permission of the Installation Commander.
While on this installation all personnel and the property under their control are subject to search.
Use of deadly force authorized.
WARNING!
NO TRESPASSING
AUTHORITY N.R.S. 207-200
MAXIMUM PUNISHMENT: $1000 FINE
SIX MONTHS IMPRISOMENT
OR BOTH
STRICTLY ENFORCED
PHOTOGRAPHY
OF THIS AREA
IS PROHIBITED
WARNING
MILITARY INSTALLATION
IT IS UNLAWFUL TO ENTER THIS INSTALLATION WITHOUT THE WRITTEN PERMISSION OF THE INSTALLATION COMMANDER.
INSTALLATION COMMANDER
AUTHORITY: Internal Security Act, 50 U.S.C. 797
PUNISHMENT: Up to one year imprisonment and $5,000. fine.

UFOs Explode in Credulous Media

ROBERT SHEAFFER

Unless you have been hiding under a rock, you have no doubt noticed that news media have been filled with gushing, uncritical articles proclaiming the glorious new reality of UFOs. On the right, we have Tucker Carlson on Fox News and the *New York Post*; on the left, we have the *Washington Post* and *The New York Times*, joined by many others of all stripes. I have written in detail about the *New Yorker*'s absurdly credulous UFO story by Gideon Lewis-Kraus on April 30, with its hagiography of UFO and ghost promoter Leslie Kean.

What they all have in common is a congenital lack of journalistic skepticism or curiosity as well as a lust for sensationalism and ratings. Golly gee whiz, Mr. Elizondo, I saw you on *60 Minutes* saying that UFOs really are real! Tell me more! (Do you have any proof of what you are saying, Mr. Elizondo? Oh, never mind.)

Finally, after a little while, a few publications dared to depart from the default path of journalistic laziness. Jason Colavito, whose blog contains a wealth of useful information and analysis, wrote in *The New Republic* (May 21):

> But the real story isn't disclosure, and it's stranger than any UFO sighting. Behind the creamy pages of high-end magazines and the marble columns of the Capitol, *the media elite and Congress are being played by a small, loosely connected group of people with bizarre ideas about science.* It's easy to dismiss UFOs as a fantasy or a fad, but the money, the connections, and the power wielded by a group of UFO believers—embedded in the defense industry and bent on supplanting material science with a pseudoscientific mysticism straight from the History Channel's *Ancient Aliens*—poses a danger to America more real than a flying saucer. (emphasis added)

Colavito reviewed in some detail the decades-long history of the UFO controversy and the role of certain people, whom he calls the *invisible college* (using J. Allen Hynek and Jacques Vallee's term), who promote and investigate weird things. He tells us about the mystical beliefs shared by Hynek and Vallee (both found value in Rosicrucianism). There is Hal Puthoff and Russ Targ, believers in the magic powers of Uri Geller. There's investor Robert Bigelow, fabulist Bob Lazar, NIDS, and many others. Using rather colorful language (which I think is appropriate here, though others disagree), Colavito writes:

> NIDS primarily researched—and failed to prove—the supposed paranormal mysteries of a patch of desert in Utah called Skinwalker Ranch. Puthoff and the NIDS team believed it to be a supernatural gateway to the space ghost dimension. (The ranch is now the set of a paranormal reality TV program.) Remarkably, they managed to convince a visiting Defense Intelligence Agency scientist, and the DIA partnered with Bigelow to investigate space ghosts. … The only public accounting of the program's research was a list of its theoretical papers on stargates, wormholes, and other sci-fi topics that "invisible college" members like Puthoff obsessed over, as well as a proprietary 494-page 2009 "ten-month report" from Bigelow's team in which Puthoff, Vallée, and others wrote about UFOs, "interdimensional phenomena" at Skinwalker Ranch, and alleged technology aliens implanted in a UFO abductee. Pentagon officials quickly concluded that releasing such an absurd report "would be a disaster," as one unnamed official told *The New Yorker*. Eventually, Team Space Ghost developed a bizarre mythology, imagining that an organized cabal in the Pentagon

actively suppressed UFO work because it feared UFOs were demons and that researching them might provoke Satan.

In conclusion, Colavito argued:

> We shouldn't let enthusiasts of space ghosts have the run of Washington to steer money and policy in the direction they want. If they insist UFOs are a national security threat, then the national media must take them at their word. No more chuckles. No more rhapsodies about mystery. We must hold Team Space Poltergeist to the levels of skepticism, seriousness, and scrutiny it pretends to demand. Quite literally, the future depends on it.

This is similar to the concluding summary I wrote at the end of my three-part article on the recent credulous *New Yorker* story (see previous article) minus the term *Space Ghosts*. This story is all being driven by a few well-connected UFO enthusiasts.

> The Pentagon's AATIP program came into existence not because "the Pentagon" or "the Navy" was concerned about UFOs (or "UAPs", as they prefer). It happened because of Robert Bigelow and Senator Harry Reid (D-NV, who was then the Majority Leader in the U.S. Senate). Reid arranged a "sweetheart" $22 million government contract for his major campaign contributor Robert Bigelow. Leslie Kean found out about it, and co-authored several articles about Pentagon UFOs in the *New York Times*. The rest, as they say, is History. Drunk History, actually.

Over in the *National Review*, Andrew Follett wrote on May 21, "Calm Down, Everyone: The 'UFOs' Aren't Aliens … The videos disclosed so far all have obvious potential terrestrial explanations."

> What much of the recent news coverage fails to mention is that "Unidentified Flying Object" does not mean either "alien spacecraft" or even "extremely advanced drone." And the videos disclosed so far all have obvious potential terrestrial explanations. … Carlson's coverage of the "GoFast" video expressly claims it shows "technologies that are far beyond our current understanding of aerodynamics" and reveals "things that are maneuvering in ways that no aircraft that we are currently aware of have the capability to." He adds that the UFOs "have no flight surfaces, no wing or anything approaching a wing … and no propulsion, so infrared doesn't pick up any jet trail or rocket exhaust." The video shows a small object apparently moving low across the water. However, the UFO was almost certainly a seabird or balloon distorted by parallax. Parallax is an effect that makes an object close to an observer, but filmed against a more distant background, seem to speed up as the camera moves. Data from the Navy camera clearly indicates the unidentified object had a wingspan of about four to seven feet in diameter, roughly the wingspan of a Canadian Goose, and flew at an altitude of 8,000 feet, well below the 29,000 feet maximum altitude of the bird. Alternatively, the Department of Defense description of the object expressly mentions a balloon (perhaps a weather balloon) as a possible explanation in the paperwork that accompanied the release of the video. If it flies like a duck, is the size of a duck, and quacks like a duck … it probably isn't an alien spaceship or ultra-advanced drone from a foreign power. But headlines such as "U.S. Navy Pilot Spots UFO" generate more clicks than "Pilot Sees Goose on Infrared Camera."

On CNN, Chris Cuomo, after taking an irrelevant swipe at former president Donald Trump, got down to interviewing Mick West about the Pentagon UFO videos. West explained the arguments against the GoFast, the Gimbal, and the Triangle UFO videos. Afterward, when an internet UFO fan boy insisted "He debunked nothing. All these cases are still unexplained. Explaining bits of the videos is not equal to identifying what was filmed," West replied, "What I debunked was specific claims people were making about the videos—like GoFast going fast, Triangle being a triangle, and Gimbal being a flying saucer (and not a glare + gimbal lock artifact)."

Which is exactly correct. If the object in the "Go Fast" video does not actually "go fast," and if the objects in the "Triangle UFO" video are not in fact triangular, then why should we care about these videos at all?—except as a demonstration of the spectacular incompetence of the Pentagon's "UAP task force."

On May 13, 2021, on substack.com, Keith Kloor summed up the best explanation for what is happening: "Why UFOs Will Never, Ever Go Away. Hint: It's Not Because of Hollywood, the History Channel or Sci-Fi Shows." He writes:

> As I have written elsewhere, it's "the news media that keeps the specter of extraterrestrials alight in our skies and minds." Yes, Hollywood movies like *Independence Day* and *Men in Black* tap into an ingrained pop culture motif, but *it's because of bad journalism that UFOs truly never, ever go away.* (emphasis added) ■

This article originally appeared on Robert Sheaffer's blog at BadUFOs.com.

CSI Statement Expresses Concerns about UFO Coverage, Offers Tips for Reporters

The following statement and guide for media coverage of UFOs was issued June 3 and reissued June 25 (the day the Pentagon UFO report came out) by the Committee for Skeptical Inquiry, publisher of the Skeptical Inquirer. *It expresses concern about some of the recent "over-enthusiastic and uncritical coverage of UFO claims," offers precautionary advice of the many pitfalls in covering UFO stories, and offers nine constructive and practical tips for covering the topic. It also provides a link to a list of scientifically informed explanatory sources. It concludes: "The public deserves the best, scientifically informed information and judgments about a topic that too often is left mainly to those who care little about science or facts."*

The statement/guide was prepared at the request of Center for Inquiry CEO Robyn E. Blumner by a working group of CSI fellows, including astronomer and educator Andrew Fraknoi, Skeptical Inquirer *Editor Kendrick Frazier, senior astronomer Seth Shostak of the SETI Institute, investigator and debunker Mick West, and NASA astronomer and space scientist David Morrison. Veteran UFO skeptic Robert Sheaffer and CSI Research Fellow Benjamin Radford also had input. Columbia University astronomy professor David J. Helfand and astronomer Edwin C. Krupp, director of the Griffith Planetarium, also saw and approved the document. Blumner and CSI Executive Director Barry Karr then approved it before it was issued.*

Here is the full text of the document.

Tips for Media in Covering UFO/UAP Claims

We are the Committee for Skeptical Inquiry, a group of scientists and science communicators long involved in advancing good science, supporting good science journalism, and helping the public tell the difference between science and pseudoscience. We have been concerned about some recent over-enthusiastic and uncritical coverage of UFO claims. The history of UFO reports and their coverage teaches us that these are topics that should be treated with great care. Pseudoscientific ideas about UFOs have repeatedly tripped up journalists over the decades.

Covering claims of sightings of UFOs (also sometimes called UAPs, unidentified aerial phenomena) has always posed challenges. These stories may excite readers—but do they reflect any evidence that the only explanation of the incidents is an extraterrestrial highly advanced space or aerial device?

Fortunately, a number of excellent, explanatory articles and broadcast segments have appeared in the last few weeks that help explain, with good technical detail, the "UFO" videos that have been the topic of so much coverage. The link we provide here [http://bit.ly/ufoskeptic] and at the end shows how to access them. It also is a guide to other reliable resources.

Some in the media have asked for our help. So, in addition, we offer these—we hope constructive—suggestions.

1. Be aware of the notorious history of these enthusiasms. UFO claims arise, generate media and public interest, often get reported in highly credulous ways, and produce a flood of copycat stories. Scientists and science-minded investigators then examine and eventually explain the claims, often to the embarrassment of the early enthusiasts. Usually the prosaic explanations get little coverage compared with the early hype. This dynamic distorts the public's (*and* the media's) perceptions. Soon the debunked claims are replaced by new claims, and the cycle starts anew.

2. Sources often conflate sightings of *something in the sky* with *extraterrestrials*. A UFO (or UAP) doesn't necessarily mean aliens. Most UFOs are turned into IFOs (identified flying objects) and turn out to be terrestrial craft, space junk, or celestial objects. Assuming that aerial phenomena must be alien ships is an illogical jump.

3. Many confuse the fact that astronomers believe, on a statistical basis, that life (even intelligent life) may exist elsewhere in the universe with the idea that such life has already been discovered by being glimpsed in our skies. It hasn't.

4. There are always going to be some unresolved sightings, often where very little is known or recorded. These few sightings are usually unresolved due to a lack of reliable information about their circumstances, not because they are inherently mysterious or unexplainable.

5. There are always going to be officials among the sprawling defense agencies (and their countless contractors) who have to take reports of UFOs or UAPs seriously. It is their job to ensure our skies are not being penetrated by aircraft or drones from other countries. That doesn't mean they accept that such reports involve spaceships from other worlds.

6. In contrast, there are always going to be a few officials among the many defense agencies or a few politicians who, for their own personal reasons (sometimes they have an anti-science or pseudoscientific/mystical view of the world), are believers in or enthusiasts about UFOs or aliens. While they may take it upon themselves to evangelize on the subject and seek coverage, their personal beliefs do not reflect any scientific or official consensus.

7. When possible, it's best to seek out independent, knowledgeable scientific and technical sources (including astronomers, skeptics, and psychologists) for their perspective. One of the roles of CSI is to provide such sources for journalists.

8. Anecdotal statements like, "It flew away at speeds unimaginable" or "turned in a way impossible for any aircraft today" are not reliable. Without knowing the distance of the supposed object (if it *is* an object), and whether the camera itself was moving, no meaningful statements can be made about velocity.

9. The Navy UFO videos reported in this latest round of news reports (some dating back to 2004) may sound impressive, but highly advanced imaging equipment has its own built-in susceptibility to errors and to human misinterpretations of their output. Plausible, terrestrial explanations have been advanced for all the Navy videos that have caused so much fuss. These may not be the full, final explanations, but so far none of the videos require resorting to unknown, advanced aircraft or spacecraft, let alone ETs. (See the work of Mick West, for example.)

These are stories filled with many pitfalls and require greater than normal care. The public deserves the best, scientifically informed information and judgments about a topic that too often is left mainly to those who care little about science or facts.

A brief one-page guide to skeptical resources on UFOs by astronomer Andrew Fraknoi, "Responding to Claims about Alien UFOs: A Brief List of Resources on the Web," can be found at http://bit.ly/ufoskeptic. ■

Note:

The full statement is on the Center for Inquiry's website at https://cdn.centerforinquiry.org/wp-content/uploads/2021/06/02161654/CSI-Tips-for-Covering-UFOs-1.pdf.

The news release summary by CFI Communications Director Paul Fidalgo is at https://centerforinquiry.org/press_releases/keep-ufo-reporting-grounded-in-reality-advise-skeptics/.

Fidalgo also prepared a handy, one-page summary, "*Skeptical Inquirer*'s Tips for Keeping UFO Reporting Grounded in Reality," which appears on the back cover of this issue.

The Hidden Connection between Academic Relativists and Science Denial

Have postmodernists and social constructivists contributed to the promotion of pseudoscience and science denial? They tend to deny all such connections, but a close study of their own publications tells an entirely different story.

SVEN OVE HANSSON

Since the 1960s, relativism about natural science has been a major trend in parts of the social sciences. Proponents of social constructivism, the strong program, deconstructionism, and postmodernism describe results from natural science as power-based social constructions rather than the currently best knowledge about the natural world. Critics have accused them of contributing to the onslaught of corporate and politicized science denial that has accelerated in the past three decades. In their defense, leading relativists have responded that their work has no connection whatsoever with right-wing movements that, for example, deny evolution and climate change. For instance, Sergio Sismondo, editor of the influential journal *Social Studies in Science*, wrote in an editorial that "views and debates within STS [science and technology studies] about the nature of expertise" are "oddly irrelevant" in the context of politicized "post-truth" and rejection of scientific expertise (Sismondo 2017, 4). Others have claimed that the critics are attacking a strawman, because social constructivism is just a methodological approach, and there is "little basis for the realists' criticism that social constructivists deny the reality of environmental problems" (Burningham and Cooper 1999, 306).

Whether knowledge relativism is just a methodological tool that cannot be used to promote pseudoscience and science denial is an empirical question. To answer it, I have conducted an extensive study of social science literature since the 1960s. The picture that emerges shows that to an astonishing extent, academic relativists have themselves used their relativist methods to defend and promote a wide range of pseudoscientific and science-denying doctrines.

Cold Fusion and Spoon Bending

In an academic paper, sociologist Malcolm Ashmore defended Prosper-René Blondlot's spurious so-called N-rays. According to Ashmore, Robert W. Wood's disclosures, which convinced the scientific world that N-rays do not exist, were "more of the flavour of stage magic, con artistry, or even slapstick, than serious science" (Ashmore 1993, 89). In the same article, Ashmore demanded "justice" for cold fusion (Ashmore 1993, 70). Sociologist Trevor Pinch described cold fusion as an example of normal science (Collins and Pinch 1998, 77) and maintained that "experiments are never alone capable of settling a controversy," such as whether cold fusion exists (Pinch 1994, 93). Bart Simon, yet another sociologist, described the replicability of cold fusion experiments as a "rationally interminable" issue (Simon 1999, 76).

In 1979, Harry Collins and Trevor Pinch defended claims of the paranormal, maintaining that "nothing unscientific is happening" in the psychological laboratories where paranormal phenomena allegedly occurred (Collins and Pinch 1979, 237). They rejected as "semi-philosophical" the basic scientific requirement of stringent evidence for claims that are highly implausible against the background of previous knowledge (Collins and Pinch 1979, 245). They also repudiated the requirement of repeatability in experimentation and dismissed the "fraud hypothesis" as applied to the infamous spoon bender Uri Geller (Collins and Pinch 1979, 249–251). Their two major examples of high-quality parapsychological research were the "paradigmatically convincing" work by Helmut Schmidt and the experiments with Uri Geller at the Stanford Research Institute (Collins and Pinch 1979, 244, 250–251). When they wrote this, competent investigators had already revealed severe flaws in both these series of experiments.

AIDS Denial and Vaccine Denial

Quite a few academic relativists have endorsed spurious medical claims. Brian Martin, professor of social sciences, applied the "tools of relativist analysis" to fluoridation (Scott et al. 1990, 482). He noted that "my symmetrical analysis of the controversy meant that the antifluoridationists were given much more credence than is usually the case in the standard scientific or sociological literature" (Scott et al. 1990, 483). The studies by historian Evelleen Richards of the claim that massive doses of vitamin C cure cancer developed into outright advocacy. In her own words, she "personally intervened" to promote this alleged cure (Richards 1996, 343). Other academic relativists have supported her conclusions as well; in 2005, Harry Collins and Trevor Pinch described the efficacy of vitamin C against cancer as an open issue, arguing that it was "never conclusively shown" that it lacks positive effects (Collins and Pinch 2005, 110). As late as in 2009, Sergio Sismondo used Richards's work to argue against the view that "consensus developed because Vitamin C has no power to cure cancer." Instead, he said, "consensus develops out of persuasive arguments, social pressures, and the like" (Sismondo 2009, 120).

According to Richards, randomized controlled clinical trials are "an inappropriate and increasingly redundant method of treatment assessment" (Richards 1996, 341). In her view, questions about the efficacy of medical treatments "must be treated as essentially political issues where there are *no* impartial experts." She proposed a "radical review" of the role of medical expertise, such that "the medical expert must be seen as a necessarily 'partisan participant' in a political debate, not as an apolitical arbiter of medical truth" (Richards 1988, 686). (If you are curious how this would work out in practice, look for videos of White House press conferences in the early phases of the COVID-19 pandemic.)

Sociologist Steve Fuller is highly influential in sociological studies of science, not least as editor of the journal *Social Epistemology*. He maintains that "the jury is still out on the intellectual merits of Duesberg's position" on AIDS (Fuller 2015, 152). Peter Duesberg claims that HIV does not cause AIDS and that antiretroviral therapy causes instead of suppresses the disease. Brian Martin promotes another thoroughly refuted claim about AIDS, namely that AIDS was originally disseminated by a polio vaccine. He correctly describes his activity in this issue as a "partisan intervention" in which he "helped set the agenda for future promotion of the theory" (Martin 1996, 245, 257, 262–263; Martin 2010). He still runs a website promoting this theory. In 2015, he published an academic paper defending disgraced researcher Andrew Wakefield and his fraudulent claim that the MMR vaccine is linked to autism (Martin 2015).

According to Richards, randomized controlled clinical trials are "an inappropriate and increasingly redundant method of treatment assessment."

Creationism

The role of academic relativism in creationism has already been documented. Robert T. Pennock has shown its central role in the construction of "intelligent design" creationism. Phillip Johnson, one of the inventors of this pseudoscience, has identified as a deconstructionist and postmodernist. The influence can also be seen in the writings of other prominent advocates (Pennock 2010). Steve Fuller is an active defender of "intelligent design" creationism and acted as an expert witness for the creationists in *Kitzmuller v. Dover School Board* (Lambert 2006).

Creationists were invited as speakers at a meeting of the Association for the Rhetoric of Science and Technology (ARST) and their presentations published in a special issue of *Rhetoric & Public Affairs* in 1998, edited by the rhetoric professor John Angus Campbell and later republished as a book. This publication, which was obviously not based on competent biological peer review, has been employed by creationists to prove their scientific respectability (Ceccarelli 2011).

Climate Change

Climate science has suffered more attacks from academic relativists than any other branch of science. In the 1990s, social constructivists saw the complicated mathematical models of the earth's climate as a perfect illustration of their claim that natural science produces only social constructions rather than reports reflecting the actual state of the natural world. Beginning in 1990, the influential American sociologist Frederick H. Buttel (1948–2005) and his coworkers took the lead in several articles attacking climate science. They described their own stance as relativistic and explicitly treated science as "one of many social modalities by

which interests are expressed or served" (Buttel and Taylor 1992, 219). In particular, climate science should be seen "as ordinary social constructions or as derived from interests, political-economic relations, class structure, socially defined constraints on discourse, styles of persuasion, and so on" (Buttel and Taylor 1992, 220). They were well aware of "the current consensus on the greenhouse effect" (Buttel et al. 1990, 58) but dismissed it as "much or more a matter of the social construction and politics of knowledge production as it is a straightforward reflection of biophysical reality" (Buttel and Taylor 1992, 214).

Brian Wynne, a leading sociologist of science, wrote several articles between 1994 and 1996 in which he promoted "sociological deconstruction of global environmental science" (Wynne 1994, 185) and criticized "the reductionist idiom of the powerful supercomputer models of the IPCC" (Wynne 1994, 174). He claimed that what came out from these models should not be described as "*discovered*, when in effect it may have been *preordained* by the culture of modelling" (Wynne 1996, 370). He was aware that his arguments would have policy conclusions and said of his criticism of climate science that "we should not be afraid to acknowledge that this *does* entail questioning the scientific knowledge involved" (Wynne 1996, 379).

Mary Douglas (1921–2007) and Aaron Wildavsky (1930–1993), whose influential "cultural theory of risk" introduced knowledge relativism in the study of risk (Douglas and Wildavsky 1982), have both attacked climate science. In 1992, Wildavsky dismissed global warming as an "environmental scare" (Wildavsky 1992, xv) and claimed that "the greater danger comes from people who would control our behavior in the name of global warming" (Wildavsky 1992, xx). As late as in 2006, Mary Douglas coauthored a paper that repudiated the IPCC as "erosive of democracy" and called its "clear separation of facts and values" a "flawed" policy precept (Verweij et al. 2006, 20).

Steve Fuller is one of the few academic relativists who still apply their relativism to climate science. He dismisses climate models, claiming that they "enable the user to manipulate the initial parameters by introducing new evidence, resulting in different anticipated outcomes that constitute a new actual world" (Fuller 2015, 278–279) and maintains that the so-called Climategate "reveals the micro-processes by which a scientific consensus is normally and literally 'manufactured'" (Fuller 2018, 22).

The Association for the Rhetoric of Science and Technology has been active in this area as well. In 1998, they arranged a debate between a proponent and an opponent of the consensus on climate science (Ceccarelli 2011). The two were presented by the moderator as "two of the most established and accomplished scientific authorities" in the world (Wander and Jaehne 2000, 219). Critics pointed out that this debate created an "illusion of uncertainty" despite "a reasonably firm consensus among scientists" (Wander and Jaehne 2000, 220). More examples of the contributions by academic relativists to climate science denial can be found in Hansson (2020).

The Impact of Academic Relativism

But are these examples merely rare failures in a social science that has in general respected and made efficient use of natural science? Concerning climate science in the 1990s and the first few years of the new millennium, this was definitely not so. In the social science literature from this period, there is a notable scarcity of papers accepting the consensus of climate science. This was also observed in the debate at the time. British sociologist Nicholas J. Fox wrote in an article that it could be "very foolish for sociologists to assume that the natural world 'really' is changing" as described in the consensus view in climate science (Fox 1991, 24). Two of his American colleagues criticized him, noting that "Fox's heavy emphasis on the social construction of the environment is consistent with the views of a majority of the few American environmental sociologists who have thus far published on G[lobal]E[nvironmental] C[hange]" (Dunlap and Catton 1994, 19). The sociology of global environmental change had "adopted a staunch constructivist orientation." This was regrettable, they said, because "if global change is seen as primarily a social construction rather than an objective (albeit imperfectly understood) condition, then it poses little threat to the future of our species" (Dunlap and Catton 1994, 7).

In 1995, an 832-page *Handbook of Science and Technology Studies* (Jasanoff et al. 1995) was published, obviously intended to cover the whole area of science studies. Climate science was discussed only in a chapter by Steven Yearley, in which he claimed that "the fundamental insight that science studies brings to the analysis of environmentalism and environmental policy concerns the disputability of scientific knowledge per se" (Yearley 1995, 467). His only reference to the natural science of climate change was a popular summary of an article from 1991 in which global warming was attributed to variations in solar activity (Kerr 1991; Friis-Christensen and Lassen 1991). The conclusions of that article had been shown to be wrong already in 1992 (Lacis and Carlson 1992; Kelly and Wigley 1992; Schlesinger and Ramankutty 1992), but he did not mention the refutations. Instead, he claimed that the 1991 article "could provoke a huge reevaluation of views on global warming. Thus something that scientists 'know' with great certainty at one time may come to be denied with equal confidence at a later stage" (Yearley 1995, 463).

Another example from this period is the 1994 book *Beyond Left and Right* by the highly influential sociologist Anthony Giddens. He mentioned climate change only briefly, maintaining, contrary to the established scientific consensus, that "whether or not global warming is occurring is a contentious matter" (Giddens 1994, 219, cf. 3–4). His only reference was to a denialist who claimed that the effects of greenhouse gas emissions were unknown; "we could frizzle or freeze or there may be no change" (Giddens 1994, 203; Lol 1996, 156).

Criticism of climate science by social scientists had its heyday in the 1990s, and since then it has become increasingly uncommon. Its decline does not seem to have depended on the consensus among climatologists, because that consensus was well established already when Buttel wrote his first article

attacking climate science. Another factor seems to have had a major impact, namely that denial of climate science became more and more associated with corporate and right-wing organizations. For most of the academic relativists, this was unwelcome political company (Wynne 1996, 363). It seems to have been for political rather than scientific reasons that social scientists' criticism of climate science has declined since the 1990s. Steve Fuller, who still perseveres in open criticism of climate science, has chided his colleagues for recoiling from their arguments against the scientific consensus "whenever such politically undesirable elements as climate change deniers or creationists appropriate them effectively for their own purposes" (Fuller 2017). It is also interesting to note that Brian Wynne, who has turned into a supporter of climate science, still denies the scientific consensus on genetic modification (Hilbeck et al. 2015). The consensus in that area is about as strong as that on climate change, but denialism does not have the associations with corporate interests that it has in the case of climate science.

The consensus on genetic modification is about as strong as that on climate change, but denialism does not have the same associations with corporate interests.

The effects of academic relativism on social studies of climate change have been long-lasting. As late as in 2008, Constance Lever-Tracy worried that her fellow sociologists paid so little attention to climate change. She attributed the problem to "our continuing foundational suspicion of naturalistic explanations for social facts, which has often led us to question or ignore the authority of natural scientists, even in their own field of study" (Lever-Tracy 2008, 452). In a reply, two of her colleagues defended social constructivism but conceded:

> There has been little engagement with climate change on the part of sociologists (and especially science studies scholars) because they are aware of the political implications and anxious of not wanting to play into the hands of climate change sceptics. (Grundmann and Stehr 2010, 905)

Overconfidence in Social Science

Some academic relativists have exhibited a remarkable overconfidence in their own competence, sometimes implying that they are more capable than specialized natural scientists to judge issues in natural science. For instance, Brian Martin "used a sociological assessment of the issues to help draw a conclusion about the scientific merits of the theory" that AIDS had its origin in a polio vaccine (Martin 1996, 249). He also used the "tools of relativist analysis" to reach conclusions on fluoridation that contradicted those of natural scientists (Scott et al. 1990, 482). Aaron Wildavsky unabashedly announced that his rejection of mainstream environmental science was largely based on assessments of natural science made by graduate and undergraduate students, "most of whom had no scientific background." They performed these assessments for course credits (Wildavsky 1995, 3).

In a joint publication, Harry Collins and Trevor Pinch strongly rebuked James Randi for his exposures of scientific misconduct, claiming that his criticism was inappropriate because he did not belong to those who "worked on the frontiers of science themselves." In their view it "might destroy science itself" if scientists leave it to people such as Randi to defend them (Collins and Pinch 1998, 141–142). However, as we have already seen, Collins and Pinch have not hesitated to express unconventional views on issues such as cold fusion and vitamin C, seemingly without having any experience from work at the relevant research frontiers.

The Underdog Theory

Academic relativism is commonly presented as a form of neutrality between knowledge claims with and without support from conventional science. However, this neutrality has often been taken to justify compensatory support of views that are disadvantaged by not having the support of science. Pinch maintained that in controversial areas such as parapsychology, if one side is "clearly marginalized," then it is "inevitable that the analyst has to do most work in making plausible the rejected view" (Pinch 1993, 370–371). In an article published in 1990, three proponents of relativism argued that relativism "is almost always more useful to the side with less scientific credibility or cognitive authority" (Scott et al. 1990, 490). In 1996, Evelleen Richards wrote that "it is quite proper for the analyst who *is* critical, to set aside the principle of neutrality and claim justice for underdogs" (Richards 1996, 346). Malcolm Ashmore, another exponent of the "underdog theory," claimed that in the conflict over smoking and health, it implied siding with the tobacco industry, because "it is the tobacco companies, not the dying smoker, who could make use of our—SSK's [sociology of scientific knowledge's]—form of analytic understanding. As epistemological losers, it is they who are the underdogs." A dying smoker was an overdog in relation to the tobacco company, because he or she had "the authority of cognitive credibility, the power that comes from being right, from being on the side of the winners in technoscientific disputes" (Ashmore 1996, 314–315).

Conclusion

The aim of this investigation was to find out if academic relativism can contribute to pseudoscience and science denial or if it is just a methodological tool that cannot be used for such purposes. We see that to a surprisingly large extent academic relativists have themselves used their relativism to promote a wide range of pseudoscientific and denialist ideas. Although this activity appears to have diminished in recent

years, highly influential scholars are still actively defending AIDs denialism, vaccination disinformation, "intelligent design" creationism, and climate science denial.

Given this evidence, there should no longer be any doubt that academic relativism can be, and has been, used to promote socially dangerous pseudoscience and science denial. But we should not throw out the baby with the bathwater. We can do without social science that is so overblown that its practitioners believe they are better judges of natural science than specialized natural scientists. But we certainly need competent historical, sociological, and anthropological studies of science that explore its social structures and mechanisms—warts and all. There is a lot of excellent such research, and we need more of it.

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Skepticism Needs More Historians and Social Scientists

To counter today's antiscience movements, skeptics need to become more comfortable with criticism of institutions, drawing on historical and social perspectives.

TANER EDIS

Organized skepticism has a reputation for attracting physicists and psychologists. To test that notion, I grabbed the March/April 2021 Skeptical Inquirer and looked at the affiliations of the Committee for Skeptical Inquiry (CSI) Fellows and its Scientific and Technical Consultants listed on the inside covers. According to my count, about 20 percent of the total have backgrounds in physics and astronomy, while psychologists came in second at 16 percent. All other disciplines were well behind. In particular, I saw only a couple of notable skeptics who were historians, specifically historians of science. Similarly, only a handful of sociologists or political scientists who study antiscience movements appear to have been recognized by CSI.

Some of this is no doubt due to the natural interests of various experts. I teach physics, and I find it easy to point out the scientific errors associated with claims of psychic powers, free energy, or alien encounters. Few but the physics majors will remember all the math I throw at them, but my students don't forget the times I ask them to pull out their phones and search for "Quantum University," warning them about the quantum bullshit attached to the sales pitches for many alternative medical practices. I first got seriously interested in fake science and the paranormal as examples of getting the physics very wrong.

I can also see why many psychologists like to criticize the weirdness that makes up the usual targets of skepticism. I teach an interdisciplinary seminar course called "Weird Science" that prompts students from all over campus to explore the nature of science through examining paranormal and fake scientific claims. I always have a couple of psychology majors in my class, and they usually seem well acquainted with the cognitive biases that feed weird beliefs. Physicists like to explain why an alleged phenomenon, such as clairvoyance, does not fit our current understanding of how the world works. Psychologists can show how psychic powers fail experimental tests. Moreover, psychologists push our understanding further, telling us why psychic beliefs are nonetheless compelling to so many people.

Our standard practice of skepticism, therefore, draws heavily on natural science and psychology, with a touch of mid-twentieth-century philosophy of science mixed in. Physicists, biologists, and chemists explain why a particular item of weirdness—quantum mysticism, Bigfoot, homeopathy—seems dubious. Psychologists test human capabilities and

describe the cognitive quirks that make all of us susceptible to weird beliefs. And most skeptics round up their standard approach with a trusty list of informal fallacies (Boudry 2017), together with a checklist of properties of fake science, such as unfalsifiability and so forth. Science, we are liable to say, is defined by the scientific method. The trouble starts when purveyors of weirdness don't follow the scientific method.

All that might seem to be a lot of background work just to nail psychic hotlines and lake monsters. But in a time when conspiracy theories are eating politics alive and antiscience movements embracing climate change denial are inviting the collapse of civilization, separating real from fake knowledge is no small detail. We hope that our standard skeptical approach, honed on nuisances such as astrology and energy healing, prepares us to deal with far more consequential forms of weirdness.

Method? What Method?

However, the standard skeptical approach has a few shortcomings. Our philosophy of science, for example, is badly outdated. Many skeptics today still invoke a preset scientific method, a foundational logic of science, and criteria such as falsifiability that cleanly separate real science from pretenders. None of these ideas has aged well. There are plenty of philosophers, historians, and sociologists who study how science works. They don't make armchair pronouncements about science but carefully study the details of actual episodes of scientific change. And such scholars in science studies are likely to say that there is no special method that defines science. Instead, we have many overlapping methods that help us build up knowledge in different domains. If we think of the scientific method as something prior to poking and prodding and explaining—as a collection of transcendent rules that underwrite knowledge and home in on the best explanations—that is a mistake. Methods have to do with better and worse ways of learning about the world: whether any method works is itself a fact about the world (Edis 2018a). In science, as in most aspects of life, we constantly make it up as we go along.

According to scholars in science studies, we have many overlapping methods that help us build up knowledge in different domains.

Our lists of cognitive biases and reasoning errors are useful enough, but we can be tempted to overextend them. Some kinds of weirdness—belief in spirits and ghosts, for example—are rooted in common features of human minds (Turner et al. 2017). Even in highly technological, secular societies, we should expect plenty of disorganized, low-level belief in ghosts and psychic powers. We can guard against the cognitive biases that prompt belief in ghosts and maybe keep such biases out of our more scholarly forms of knowledge, but that is perhaps the best we can do.

Other kinds of weirdness, such as creationism, are different. While creationism takes advantage of cognitive biases favoring perceptions of design and purpose (Kelemen 2012), the elaborate fake sciences of "scientific" creationism and intelligent design are impossible to understand outside the context of highly organized monotheistic religion and reactions against secularizing trends. Creationism has more social and historical depth than those ghost beliefs that bubble up from cognitive biases.

Confronting Creationism

The species of weirdness that have fascinated me most have been intelligent design and the Islamic varieties of creationism. I started by chasing down creationist mistakes in physics and biology. After all, identifying how explanations go wrong can be very useful when figuring out how the world actually works. However, looking for a fuller understanding of creationism led me beyond scientific mistakes and cognitive biases. Why, for example, do we see movements that coalesce around elaborate fake sciences? Deeply religious communities do not have to adopt creationism. Instead, they can passively reject evolution and ignore scientific challenges to traditional beliefs. But sometimes, in some places, religious intellectuals have not only proposed an alternative to mainstream science, such an apologetic approach has caught fire. Denying evolution has become important, and creationism has achieved mass popularity. Religious intellectuals have founded institutions that develop and build on creationist ideas. Such examples of fake science, to me, are more interesting and more consequential than bands of amateur ghost hunters misusing lab instruments. Figuring out exactly how creationists fail to describe the world should tell us a lot about the nature of real science as well.

Studying creationism soon leads to the complex histories of reactions to evolution around the globe (see, for example, Brown 2020) and how creationism takes shape as part of right-wing populist movements. Knowing the science helps us see how creationists go wrong. The standard skeptical checklists sometimes help us understand how creationists appeal to their constituencies in conservative religious populations. But lists of cognitive biases and reasoning errors are not very useful for anyone who is trying to figure out the historical and social contexts that mark varieties of creationism.

Creationism does not proceed out of individual cognitive errors; it is organized and promoted by *institutions*. These start with apologetics factories such as Answers in Genesis or the Discovery Institute but also include conservative religious and media networks. Creationists then try to bypass or transform mainstream scientific institutions such as university science departments. In some conditions, as in Islamist-governed Turkey, they can enjoy considerable success (Edis 2021). If we think that varieties of creationism are not really scientific, this is not because creationism fails to satisfy an outdated checklist of features such as falsifiability. The main creationist claims

misrepresent physics or biology and are straightforwardly false. Creationism is not science, because creationist institutions are not structured to successfully learn about the world (Edis 2018b).

Creationists work toward producing an alternative intellectual culture in which claims that appear crazy to mainstream scientists instead seem plausible. Some of this work involves exploiting cognitive biases and common reasoning errors for apologetic purposes. But there is more to the story. In social settings, beliefs have costs: we need to devote resources to acquiring beliefs about the world, and we also incur costs associated with possessing and acting upon our beliefs. In political environments where signaling group loyalty is important, such costs make some false beliefs instrumentally rational. In such cases, even slow-moving, rational belief-forming mechanisms can be recruited to favor false beliefs (Edis and Boudry 2019). Skeptical checklists emphasizing individual reasoning errors are of limited help in such circumstances.

If we want to apply skepticism beyond ghosts and Bigfoot, tackling the civilization-threatening antiscience movements of today, we need to learn more from examples such as creationism. The most consequential forms of science denial are organized, social, and political; they demand that we pay attention to institutions, not just flaws in individual cognition.

Socially Constructing Skepticism

Because skeptics emphasize natural science and psychology, we are not as used to more historical and social ways of thinking. We don't like politics, preferring a "just the facts, ma'am" style of expertise. Organized skepticism, moreover, has a strong element of advocacy for science, which attracts us toward a heroic image of science identified with human progress (see, for example, Pinker 2018). However, if we shift our focus to institutions, we soon find that analyses of institutions can also be applied to science and skepticism. This means criticism as well as celebration, and skeptics are not guaranteed to be happy with the results.

One reason to be wary is skeptics' recent history with philosophies of science that emphasize how knowledge is socially constructed. Prominent scientists and skeptics still point to episodes from the "Science Wars" of decades ago to illustrate how postmodern critiques of science go off the deep end (Dawkins 2021).

That is unfortunate. In today's science studies, it has become a commonplace that science is a social construction—for good reason. But the fact that we construct knowledge through social mechanisms does not mean that science is unreliable, arbitrary, or divorced from reality checks in the lab. Social construction does not imply that science is a fairy tale any more than neuroscientists telling us that our reasoning is due to our neurons firing implies that all our thoughts are fantasies. It just means that we have to treat science and reason as earthly phenomena rather than transcendent ideals. Science studies casts doubt on skeptics' myths such as a preset, universal scientific method. But that doubt arises from detailed investigation of scientific institutions, often aiming to explain the undeniable progress science has made. At least one CSI fellow, science historian Naomi Oreskes, adopts the more complex perspective of science studies to argue that that scientific expertise fully deserves public trust (Oreskes 2019).

I am convinced that the messier, less heroic picture of science that emerges from studying institutions is also more accurate. If we want accuracy, making better contact with

complicated material realities is a good thing.

Still, bringing reason down to earth also raises some awkward questions. If we can identify institutional pathologies in creationism, we can also wonder about shortcomings in our own universities and research institutes. Any working scientist who has had reason to complain about university administrations, funding agencies, or the peer review process knows that institutions matter and that they are never perfect. But then, if we learn something about the institutional features that promote paranormal and fake scientific beliefs, we can use this knowledge to help improve how we do real science. For those of us who care about accuracy, this also has to be a good thing.

Skeptics also promote the public communication of science. Attending to the historical and social context of knowledge production is especially important if we want to communicate correctly. We often adopt a model where we skeptics represent scientific expertise and act to correct those who are misled by cognitive biases and faulty reasoning. But examples such as creationism—where fake science is woven into right-wing populist movements that come to distrust politically inconvenient forms of expertise—also expose the limits of such a model. Slogans such as "trust the science" do not just express a politically neutral recognition of reality but are too often joined with a technocratic politics that promotes the interests of a credentialed professional class over competing groups—and the professionals are not unified. The interests of scientists and skeptics are not always the same as those of economists, management consultants, or tech oligarchs. Our desire for accurate knowledge is not well-served by populist politics centered on loyalty to ethnicity or religion. But then, our scientific interests can also conflict with factions of professionals who would turn science into a mill for intellectual property production and mere infrastructure for business and technology (Edis 2020).

The advancement of our sciences has always been accompanied by institutional changes. Often these are responses to external pressures such as the demands of funding sources. But we can also be more reflective, asking how to do science even better in changing circumstances.

Historians and Social Scientists

A more accurate understanding of science requires moving beyond our diagnostic checklists and our heroic image of science. Figuring out the persistence of fake science requires that we pay more attention to institutions. All this demands that skeptics make better use of historical and social perspectives, going beyond physics and psychology.

I certainly would enjoy running into more historians and social scientists in skeptical circles. My involvement with skepticism has roots in the same kinds of curiosity that led me to physics. But what has kept me fascinated for decades now is the way I have encountered not just psychologists and other academics but also magicians, media critics, and consumer advocates. When I teach my students some esoteric detail about quantum mechanics, I always worry that I am spending time on matters that only a few aspiring specialists would care about. But when I bring in skepticism about paranormal and fake scientific claims, I make a connection to deeper questions about the nature of knowledge and reality. Almost anyone could find something to care about, even something to contribute. When I teach my Weird Science class, I always learn from students who do not instinctively defer to scientists. Doing an even better job with skepticism requires, I think, that we should further broaden our perspective and learn more from historians and social scientists.

A more accurate understanding of science requires moving beyond our diagnostic checklists and our heroic image of science.

With any luck, if we manage not to destroy civilization, perhaps in a decade or two, a count of CSI Fellows and Consultants will reveal a slightly smaller proportion of physicists and psychologists and a larger number of historians and social scientists. That, I think, would be progress. ■

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‘I Was Wrong’: Religious Prophecy and the 2020 Election

The prophetic movement relies mostly on prophecies that are vague enough to resist testing—but what happens when a concrete prediction, such as the results of an election, is proved wrong?

TED GOERTZEL

Pastor Jeremiah Johnson had three prophetic visions on October 20, 2020 (The Altar Global 2021a). The first was of the Los Angeles Dodgers winning the World Series that began on that day. The second was of Amy Coney Barrett’s appointment to the U.S. Supreme Court. The third was of Donald Trump winning reelection. When the first two visions came true, Johnson enthusiastically told his social media followers that God had foretold Trump’s victory.

Statistically speaking, the pastor’s predictions were unimpressive. The Dodgers had at least a 50 percent chance of winning the World Series, and Barrett’s confirmation was almost certain. Theologically, there was no reason to believe that God concerned himself with baseball games. But preachers in America’s burgeoning prophetic charismatic movement aren’t rated by their batting averages; their fans celebrate their successes and usually overlook their failures (Duin 2021).

At only twenty-seven, Jeremiah Johnson had built a large following among evangelical Christians eager to anoint Donald Trump as God’s man in the White House. In 2015, Johnson had prophesied that “Donald Trump is going to be used by God as a trumpet in America to expose darkness and perversion.” He acknowledged Trump’s personal faults but opined, “could God not use the wicked and ungodly to bring about His plans?” After all, that’s what God had done when he chose Cyrus to end the Babylonian captivity in 539 BCE; perhaps Trump was to be the Cyrus of our time. Johnson urged his followers:

> Listen to the trumpet [Trump] very closely for he will sound the alarm and many will be blessed because of his compassion and mercy. Though many see the outward pride and arrogance, I have given him the tender heart of a father that wants to lend a helping hand to the poor and needy, to the foreigner and the stranger. (Johnson 2015)

God’s spiritual heart transplant didn’t noticeably improve Trump’s attitude toward the poor, foreigners, and strangers. But that didn’t shake pastor Johnson’s faith. His confidence in his gifts was unshaken until the 2020 election forecast went wrong. He said, “To my knowledge this is the first wrong prophecy I’ve given on this kind of level ever in my life” (The Altar Global 2021b).

Admitting that he was wrong took courage; others in the charismatic prophetic movement resorted to denialism. Johnny Enlow, a prominent prophetic preacher, argued:

> President Trump is the president that has been ordained

> [and] nominated by the Lord. He won over 70 percent of the vote and 49 of the 50 states. So he won. He is sanctioned in heaven, on earth, and he's here, but we have somebody else [in the White House]. (Ben Lim Global 2021)

Gerald Flurry, the founder and editor of *Philadelphia Trumpet*, a magazine that promises more than a million readers accurate forecasts of where world events are leading, argued that "we can be sure God is going to return Donald Trump to power sooner or later" and that "perhaps He looks on Mr. Trump as still being president of the United States!" (Flurry 2021).

Flurry was defending his prediction that "Donald Trump Is Going to Win this Election," a prediction that was audacious because it was published on November 9 when he knew that "the media have already crowned Joe Biden." But he was confident that "they are going to be shocked and disgraced" (Flurry 2020). Flurry's prediction wasn't based on a dream but instead on his interpretation of biblical texts that he believes are infallible.

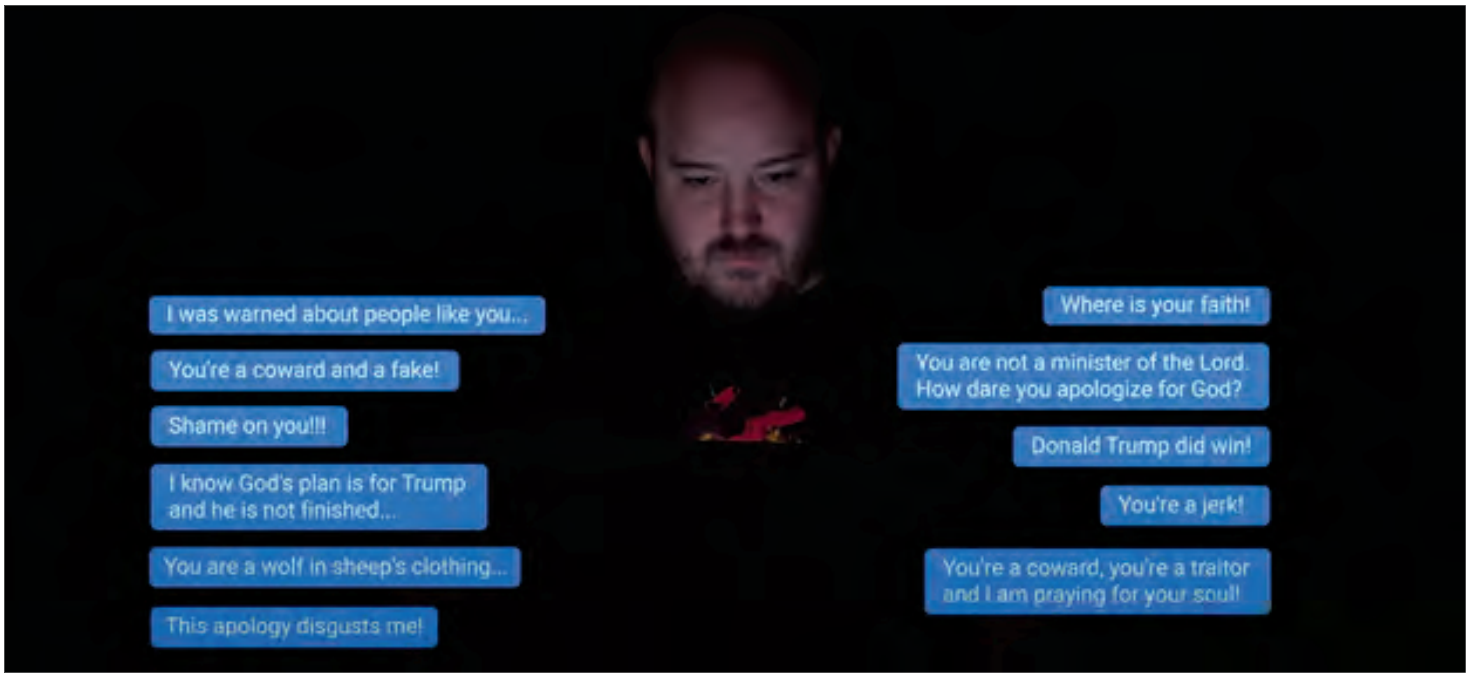
The belief that ancient texts predict current events is the central theme of Flurry's magazine. He believes that Donald Trump is "an end-time antitype of King Jeroboam ii of Israel" whose reign was from 931 to 910 BCE (Flurry 2021). This is not just an analogy; there is no time limit on biblical prophecy, and believers think many prophecies from thousands of years ago are still pending. Flurry notes that "first-century apostles thought Jesus Christ would return in their day—so they were 2,000 years off in their thinking!" And counting.

Scholars of biblical prophecy realize that many predictions seem to have failed, but they argue that it is wrong to submit biblical prophecy to this kind of test. Some say that biblical prophecies apply only to the *eschaton*, the end of time, an event that many believe is imminent … so they are still waiting. Others say that the point of biblical prophecy is not to predict an inevitable future but to warn people of imminent disasters or turning points. If the people heed a prophetic warning, God may call off the prophecy. God can change his mind at any time, and whatever happens must have been his will (Chisholm 2010).

The prophetic tradition has many excuses for the apparent failure of a prophecy, but Jeremiah Johnson didn't rely on any of them. On January 7, the day after the invasion of the U.S. Capitol, he posted a letter acknowledging quite forthrightly that he had been wrong. He fully expected to be denounced as a false prophet, a very serious matter for a man whose career is based on channeling the word of the Almighty. He said the financial risk to him and his employees was substantial, but he was a man of God, not a businessman, so he prayed on it and God's answer was: "I want you to admit that you missed it."

Johnson received thousands of angry messages from believers—not because his prophecy was wrong but because he admitted it. He reported that many "actually began to persecute me; they actually began to threaten my life because I repented." Many insisted that Donald Trump had actually won the election but that it had been stolen from him. Others insisted that the prophecy would still come true because Trump would somehow reverse the outcome.

Michael Brown, a prominent radio host and sage of the AskDrBrown Facebook page, is a respected elder in the prophetic movement. Responding to the failed prophecy controversy on December 11, he took a firm position: "If Donald Trump is not inaugurated and Joe Biden is, the prophets are wrong. Period" (AskDrBrown 2020). He rejected the common excuse that people didn't believe enough or didn't pray enough: "It's not as if we don't have enough faith. No, it has to come true. We have had plenty of people pray." He also


I was warned about people like you...
You're a coward and a fake!
Shame on you!!!
I know God's plan is for Trump and he is not finished...
You are a wolf in sheep's clothing...
This apology disgusts me!
Where is your faith!
You are not a minister of the Lord. How dare you apologize for God?
Donald Trump did win!
You're a jerk!
You're a coward, you're a traitor and I am praying for your soul!

Screenshot from "I Was Wrong: A New Series on Donald Trump and the Prophetic Controversy" (The Altar Global 2021b)

rejected the political excuses: "I don't think the courts are corrupt, the Supreme Court. If there is fraud, I believe it will come out. If Donald Trump does not serve a second consecutive term, the prophets were wrong."

Brown also pointed out that none of the prophets had forecast COVID-19 before it happened, and none had forecast the racial protests following George Floyd's killing. Christians could have used a warning about those things. But the failure to prophesize wasn't the prophet's fault, he believed; it was because God didn't choose to send a warning. Brown said he was "deeply concerned over the attachment the church has to Donald Trump." He thought they were idolizing him and were better known as Trump supporters than as followers of Jesus. He stated: "The Republican Party is not the Kingdom of God, and not every Democrat is a demon. … It could well be that a Biden presidency is just what the Church needs."

Brown also pointed out that none of the prophets had forecast COVID-19 before it happened, and none had forecast the racial protests following George Floyd's killing.

Jeremiah Johnson agreed, stating that "we must humble ourselves and recognize that if God wanted Donald Trump in office in 2020—he would be!" In a frank self-criticism, Johnson said it was prideful of him to predict an election based on his dream. It was also theologically wrong, in his view. Old Testament prophets often received messages directly from God, but New Testament Christianity is beyond that. It relies on the word of Jesus, not dreams and visions. He sought the counsel of experienced elders and started a new ministry based on preparing believers for the return of Jesus—an event for which he did not give a date.

The prophetic movement relies mostly on prophecies that are vague enough to resist testing. Gerald Flurry claims that "God prophecies in the Bible, and His prophecies are sure! (2 Peter 1:19). However, He usually does not show the whole picture in detail or all at once. He often speaks in a coded way, and only later reveals that code" (Flurry 2021). In this respect, biblical prophecies are much like the hints dropped by Q, the mysterious prophet of the QAnon movement. Believers are challenged to interpret the texts and sometimes their dreams may give them ideas. Flurry doesn't speculate about why God chooses to communicate in this way.

Believers are generally unconcerned about the lack of objective statistical evidence that prophecy works. James Beverley told interviewer Julia Duin that "my research shows that the prophecies are usually vague, sometimes totally wrong, and, with rare exception, have failed to be properly critical of Trump" (Duin 2021). But Beverley's published anthology of biblical prophecies does not even raise the issue of their accuracy (Beverley 2020).

Scholars have many interests, but preachers and magazine writers promote prophecies as foretelling the future. Wishful followers may be satisfied with predictions vague enough to be reconciled with any outcome, but this doesn't work with elections. As Michael Brown observed: "There is no middle ground. There is no third option. There is no reality in which Trump actually did win but in fact didn't win. Or in which he's the president in God's sight but not in man's sight. Not a chance. To entertain possibilities like this is to mock the integrity of prophecy and to make us charismatics look like total fools" (Brown 2020).

Jeremiah Johnson and Michael Brown will likely refrain from predicting future elections, but Gerald Flurry has doubled down: "One thing is certain: God is going to bring Mr. Trump back. We know he's coming back—it's in the prophecy! It's just a matter of when. It will happen at most in four years—yet I can't conceive of it being anywhere near that length of time. It could be much quicker—we will see" (Flurry 2021).

Indeed we will. ■

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Watch That Fringe and See How It Flutters

Glenn Branch

On the Fringe: Where Science Meets Pseudoscience. By Michael D. Gordin. New York: Oxford University Press, 2021. ISBN 978-0-19755-576-7. 136 pp. Hardcover, $18.95.

A historian of science at Princeton University specializing in modern physics, Michael D. Gordin is also the author of *The Pseudoscience Wars* (2012), a book devoted to—in the words of its subtitle—Immanuel Velikovsky and the birth of the modern fringe. (David Morrison reviewed *The Pseudoscience Wars* in the March/April 2013 SI.) But, as the title of his Velikovsky book suggests, Gordin is particularly interested in the concept of pseudoscience. In the introduction to *The Pseudoscience Wars*, he argued, in outline, that because there are no features possessed by all and only pseudosciences, the concept of pseudoscience is "without real content" and "lacks a core." Instead, he suggested, *pseudoscience* is simply a term of abuse applied to views that scientists regard as threatening. Yet, as a result, examining historical controversies over pseudosciences illuminates the workings of science itself: "what scientists thought about their standards, their position in society, and their future." In essence, *On the Fringe* reiterates the argument for a general readership, with the addition of a wide, if shallow, sampling of examples of pseudoscience.

In chapter 1, Gordin reviews the history of what philosophers call the "demarcation problem"—finding a principled way to distinguish science from pseudoscience—and concludes that the problem is intractable. Chapters 2, 3, 4, and 5 then provide a whistle-stop tour of four "families" of pseudoscience: vestigial sciences (astrology and alchemy), hyperpoliticized sciences (Aryan physics, Lysenkoism, and eugenics), counter-establishment sciences (phrenology, creationism, cryptozoology, Velikovskianism, UFOlogy and ancient astronauts, and flat-earthery), and parapsychology (Mesmerism, spiritualism, and academic parapsychology). The tour continues in chapter 6 (N-rays, polywater, water memory, and cold fusion) but with a different agenda in mind. Here Gordin argues that "The boundaries between fringe, fraud, and mistaken science are blurry" (82). Chapter 7 concludes by addressing what Gordin calls "the Russian questions," after the titles of two nineteenth-century Russian novels, *Who Is to Blame?* and *What Is to Be Done?* Appreciating the heterogeneity of the pseudosciences, he suggests, will dispel the temptation to identify a single culprit and enable a targeted response to the most dangerous forms.

Gordin's descriptions of the various pseudosciences are concise and elegant, and his description of up-to-date work in the history of science is particularly useful, especially regarding the vestigial sciences of astrology and alchemy. It is remarkable that, examining seventeenth-century illustrations purported to encode alchemical secrets, historians "have been able to decode the symbols so that when they have tried the associated experiment in a modern laboratory with the right chemicals, they have replicated the results the seventeenth-century alchemists claimed" (26)—though not, presumably, the transmutation of lead to gold! Yet there are a few errors of fact that are plausibly owing to carelessness. For example, the decision in *Kitzmiller v. Dover* was issued by a trial, not an appellate, court (11); William Jennings Bryan was on the prosecution, not the defense, team in *Tennessee v. Scopes* (48); the flat-earther Wilbur Voliva's middle name was, regrettably, Glenn, not Glen, and his earliest profession of flat-earthery seems to have been in 1915, not 1914 (57); and CSICOP was the *Committee*, not the *Commission*, for the Scientific Investigation of Claims of the Paranormal (72).

These are trivial errors, but it is not so easy to explain, or excuse, a handful of passages in which Gordin offers substantive claims that are at best dubious. Observing that falsifiability was invoked to discredit creationism in *McLean v. Arkansas* (1982), Gordin asserts, "The result was that [Karl] Popper's falsifiability was incorporated as a demarcation criterion in a slew of high school biology texts" (11). But in the body of education research on the treatment of the nature of science in modern American textbooks, neither falsifiability nor demarcation seems even to be mentioned, suggesting the absence of these concepts. After noting the involvement of Carl Sagan and B.F. Skinner with

CSICOP, Gordin comments, "The willingness of high-profile scientists to engage in efforts like CSICOP has also diminished over the years" (73). But is it plausible to think that Neil deGrasse Tyson and Steven Pinker (to name two fellows of the Committee for Skeptical Inquiry with specialties similar to Sagan's and Skinner's) are any lower-profile or any less supportive of efforts to combat pseudoscience than their predecessors?

Although Gordin contends that the concept of pseudoscience lacks a core, he occasionally comes close to defining it: for example, he observes that "those things that look an awful lot like science but for some reason do not quite make it … are frequently designated 'pseudosciences'" (2). Indeed. Why not define pseudoscience as a view misrepresented as having contemporary scientific credibility, as philosopher Sven Ove Hansson (among others) suggests? There are several different requirements that a view must satisfy to have scientific credibility, of course, meaning that there are several different ways for pseudosciences to fail to do so. In light of Gordin's fondness for nineteenth-century Russian novels, such a definition might be regarded as in the spirit of the opening of Leo Tolstoy's *Anna Karenina* (1878): in Constance Garnett's translation, "Happy families are all alike; every unhappy family is unhappy in its own way." Importantly, because a Hanssonian definition of pseudoscience presupposes the concept of scientific credibility, it cannot be used in the project of formulating a global demarcation criterion between science and pseudoscience. But it is none the worse for that.

Among the virtues of a Hanssonian definition is that it enables a principled taxonomy of pseudosciences based on the ways in which they fail to attain scientific credibility. (There would still be overlap, as with Gordin's categories, because a pseudoscience may fail to be scientifically credible in multiple ways.) In such a taxonomy, Gordin's category of hyperpoliticized sciences might be retained, because these share the fault of privileging political ideology over scientific evidence, but generalized to include creationism and flat-earthery, which similarly privilege religious ideology over scientific evidence. The categories of counter-establishment sciences and parapsychology, however, would dissolve, perhaps to be replaced by magical thinking (astrology, Mesmerism, and spiritualism) and uncritical acceptance of liminal phenomena (cryptozoology, UFOlogy, and academic parapsychology). The category of vestigial sciences (at least as a category of pseudoscience) might be abandoned, insofar as there was never a time when alchemy was widely misrepresented as scientifically credible by contemporary standards. A full discussion would also add further objects of appraisal, because pseudoscientific attitudes, behaviors, and claims can appear even in the absence of any overarching pseudoscientific doctrine.

In the last few pages of *On the Fringe*, addressing the Russian question of what is to be done, Gordin expresses pessimism about the idea of improving science education to combat the seemingly constant onslaught of pseudoscience. "Science education is a wonderful thing, and I am entirely in favor of it," he writes, adding, "It seems unlikely, however, that improvements in science literacy would stamp out the fringe," adducing the prevalence of flat-earthers, all of whom presumably were taught that Earth is spherical (100). Here he seems to be assuming that improvements in science literacy would consist merely of increases in the amount of scientific information provided to students. In fact, science education in the United States is in the slow process of pivoting to inquiry-based learning, in which students are guided to investigate phenomena and test hypotheses in the ways that scientists do. And research on ways of inoculating students specifically against pseudoscientific challenges to socially controversial topics in science, such as evolution and climate change, is ongoing. Imparting understanding of pseudoscience is hopefully going to be a part of science education in the future. ■

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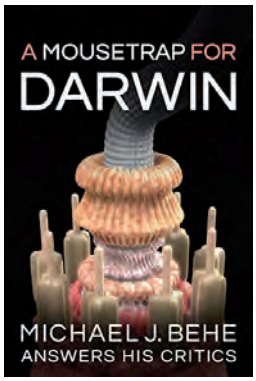
Irreducible Unfathomability

Timothy J. Langley



A Mousetrap for Darwin: Michael J. Behe Answers His Critics. By Michael Behe. Seattle, Washington: Discovery Institute Press, 2020. ISBN 978-1936599912. 556 pp. Hardcover, $31.95; softcover, $25.95.

Michael J. Behe is a professor of biochemistry at Lehigh University in Bethlehem, Pennsylvania. With the publication twenty-five years ago of *Darwin's Black Box*, Behe began to advance an argument against Darwin's theory that evolutionary traits said to alter a species by natural selection typically consist of multiple component parts, resulting from separate genetic mutations occurring on different occasions. The completed traits are "irreducibly complex," because they cannot function until all their component parts have first reported for duty. So, *contra* Darwin, the survival advantage *eventually* conferred by the functioning trait cannot possibly have "naturally selected" all the trait's necessary component parts, which had to have made their appearance *before the trait could function at all*.

Behe concludes that the only possible explanation for the appearance of irreducibly complex traits that aid survival and transform species is that they were intelligently designed in advance.

Now comes Behe's latest book, *A Mousetrap for Darwin.* It is a 556-page compendium of more than 100 brief essays by Behe responding to the many criticisms of his argument over the years.

But however much has already been said about Behe's idea (most recently, for example, in Nathan Lents's Skeptical Inquirer article "Behe, Bias, and Bears (Oh My!)," March/April 2021), there is at least one thing about it that cannot be said enough: What he lumps together as "intelligent design" is not a single hypothesis but an amalgam of two very different hypotheses. The first qualifies as a scientific claim, while the second does not.

Behe's first hypothesis ("irreducible complexity") is that Darwin's theory of random mutation/natural selection is inadequate to account for available data on how evolution actually works. Whatever you think of it, that is a claim made within the boundaries of biological science and amenable to scientific inquiry. It may be proven right, wrong, or something in between. But whatever it proves to be, the proof will be evidentiary, and Behe's fellow biologists will be the judges of what the evidence shows. Most of the essays in *Mousetrap*—over 75 percent by my count—address only this specific claim of irreducible complexity.

Behe's second hypothesis ("intelligent design") goes like this: because random mutation/natural selection cannot account for evolution, only an intelligent actor can. The premise of this second hypothesis, Darwinian inadequacy, remains in question. But even if that premise were proven, Behe does not explain why the conclusion of supernatural design would be compelled by it or why that should be the sole alternative to random mutation/natural selection.

As for the source of intelligent design, Behe isn't talking. "I argue simply for the conclusion of design itself," he says. "My argument … is directed merely toward the conclusion of design. … The core claim of intelligent design theory is quite limited. It says nothing directly about how biological design was produced, who the designer was … or other such questions," Behe wrote in a letter to *Science* in 2000.

Nevertheless, despite Behe's best efforts to write a play about Hamlet without the Prince of Denmark, we can hardly miss his point: The unnamed Generator of Design ("GoD" for short) is intelligent like we are. Because no merely natural process such as random mutation/natural selection can produce the outcomes the GoD intends, the GoD has obviously intervened at one or more points over time to achieve its designs. (For an irreverent look at some of these needed "interventions," see the recent Creationist Funhouse series in SI.) Science cannot observe how the GoD has done this, but science has accumulated sufficient evidence of irreducibly complex results that no natural process can explain to conclude that the GoD, whatever the GoD may be, must have done whatever it is the GoD does to make species evolve.

Unpacking Behe's second hypothesis provides insight into why science operates by the rule of thumb known as "methodological naturalism." This is the working assumption that answers to questions about how the natural world works should be sought exclusively within the same natural world from which the questions arose. Methodological naturalism preemptively forecloses supernatural explanations such as intelligent design for natural phenomena such as evolution.

A supernatural GoD, by definition, cannot be located in space/time, those ultimate coordinates of the only arena of scientific inquiry there is. Scientific inquiry can therefore learn nothing about the properties and characteristics of a GoD. The mechanism by which a GoD might efficiently interact with the natural world to control the course of biological evolution is categorically beyond the capacity of science to even guess at. And if nothing can be either known or ruled out about the location, the nature, and the instrumentalities of Behe's GoD, then no further data will be forthcoming from Behe's second hypothesis—either about evolution or about the GoD.

The intractable problem with intelligent design is not that it is a scientific hypothesis that is unproven or false. The problem is that it is not a scientific hypothesis at all. You might say its terms are irreducibly unfathomable, an inquiry-ending feature that invariably accompanies a resort to the supernatural.

Methodological naturalism is not an irrational bias that needlessly restrains scientists from following the evidence to wherever it leads. It is a wisdom arising from the collective experience of scientists across the centuries that irreducibly unfathomable explanations for how the natural world works don't lead anywhere. ■

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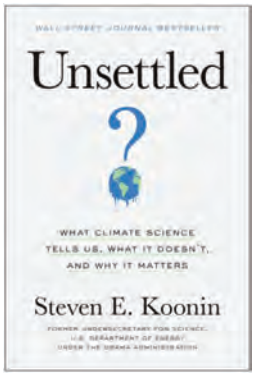
Tilting at Old Strawmen on Climate Science

Mark Boslough



Unsettled: What Climate Science Tells Us, What It Doesn't, and Why It Matters. By Steven E. Koonin. Dallas, Texas: BenBella Books, 2021. ISBN: 9781950665792. 240 pp., $24.95.

I would normally ignore a book by a non-climate scientist promising "the truth about climate science that you aren't getting elsewhere," because such language is a red flag. But I've known the author of *Unsettled*, Steven Koonin, since I took his quantum mechanics course as a PhD student at Caltech in the 1970s. He's smart and I like him, so I'm inclined to give his book a chance.

But smart scientists aren't always right, and nice guys are still prone to biases—especially if they listen to the wrong people. In an apparent quest for fairness when he led a committee of the American Physical Society (one of my professional organizations) to assess its statement on climate change, Koonin recruited three scientists to represent the 97 percent consensus along with three contrarians, presumably to speak for the other 3 percent [the actual consensus is over 99 percent; see "The Consensus on Anthropogenic Global Warming" in the November/December 2015 SI]. The lack of proportionate representation amplified the contrary opinions that he heard—and only in one direction. He completely ignored another, equally unfounded, contrary view. The position sometimes referred to as "doomism" (the belief that the worst case is inevitable and it is too late to prevent it) was not represented.

The three contrarians had a long and well-documented history of engaging in *ad hominem* attacks on mainstream climate scientists and misrepresenting their work. Most of the technical mistakes and misrepresentations in *Unsettled* may simply be attributable to Koonin's trust of those advisors and lack of rigorous independent verification.

Unfortunately, *Unsettled* is a book you can accurately judge by its cover. Koonin's title hints at a logical fallacy called the "strawman" argument. The blurb on the flap confirms this with its opening sentence: "When it comes to climate change, the media, politicians, and other prominent voices have declared that 'the science is settled.'"

A whit of fact checking by the author or publisher would have shown that this claim is not true. In fact, Koonin makes use of an old strawman concocted by opponents of climate science in the 1990s to create an illusion of arrogant scientists, biased media, and lying politicians—making them easier to attack.

The phrase "science is settled" is re-

peated as Koonin's target throughout the book, even though it has never been in common use by climate scientists and their supporters. If it were, then Google and LexisNexis searches would surely turn up instances, but the opposite is true. All the examples I found were from *critics* claiming that advocates of the consensus had said it. The earliest published use I found was a July 11, 1996, letter to the *Wall Street Journal* from prominent denier Fred Singer, falsely claiming that the IPCC report had been inappropriately tampered with for political purposes and that "politicians and activists" were "anxious to stipulate that the *science is settled*."

Singer's strawman gained traction a year later when William O'Keefe, the chairman of Global Climate Coalition (a lobbying organization opposed to climate action) claimed in a statement to Congress that "the [Clinton] Administration repeatedly quotes that [IPCC] sentiment out of context in its statements that the 'science is settled.'" It stands to reason that repeated use of the phrase "the science is settled" would be found in searches if true. Searches do, however, turn up (in the White House archive) what Bill Clinton actually said only two weeks before Singer's letter: "The science is clear and compelling: We humans are changing the global climate." Nobody could argue with that at the time, nor can they now; even climate change deniers accept that human activity has altered the climate.

There are many examples of physical problems that are difficult to model, have large uncertainties and unpredictable outcomes, put people at risk, and require policy decisions and international treaties. My primary field of planetary defense is one. It's a clear and compelling fact that Earth will be hit by another asteroid. We just don't know where, when, or how bad it will be. The recent reentry of an errant Chinese upper stage rocket provides a more concrete analogy. The fact that its orbit would decay and it was going to come down was not in question and could rightly be called "a settled fact." Various models had huge uncertainties, disagreed with one another, and could not predict the reentry location. But those inadequacies cannot be used as evidence for any absurd claim that it was going to stay in orbit. Anyone taking that position would be guilty of the same logical fallacy (called "impossible expectations") that Koonin directs toward climate science.

Another example of a strawman argument in *Unsettled* is the claim that the term *climate change denial* is intended to invoke Holocaust denial. Koonin says, "I find it particularly abhorrent to have a call for open scientific discussion equated with Holocaust denial, especially since the Nazis killed more than two hundred of my relatives in Eastern Europe." I do not doubt the sincerity of his anger, but it is misdirected.

Again, it's aimed at a strawman. Climate change deniers are (by definition) not asking for open scientific discussion. The term *denier* is reserved for those who simply deny. There is also no evidence that the term *climate change denial* is intended to invoke Holocaust denial. Ironically, this connection was first made by the late Hollywood screenwriter Michael Crichton, speaking at a 2003 lecture at Caltech, where Koonin was provost. The word *denier* literally means "one who denies," and the term has been used this way since the 1400s. The term *Holocaust denier* didn't come into widespread use until the 1980s. By the early 1990s, *denier* was independently being used to describe those who deny the science of climate change.

Furthermore, it is climate scientists, not deniers, who have been compared to Nazis and perpetrators of genocide. In fact it was Crichton himself, in the appendix to his 2004 book *State of Fear*, who directly equated climate scientists

to eugenicists who had a role in the "killing of ten million undesirables." Crichton also explicitly compared climate scientists to Trofim Lysenko, whose work he described as resulting in "famines that killed millions and purges that sent hundreds of dissenting Soviet scientists to the gulags or the firing squads." Nevertheless, Koonin praises Crichton and cites *State of Fear* as evidence that he was an "outspoken advocate for scientific integrity" who "looked askance at the public presentation of climate science."

Whether one thinks it is more abhorrent to be described by the same word as those who deny other things, including the Holocaust, or to be explicitly equated to those who carried out the Holocaust is a matter of personal opinion but may indicate unconscious bias. Koonin's bias became evident in the introduction by his use of biased language. Climate scientists "adjust model results to *obfuscate* shortcomings." "Climate *alarmism* has come to dominate US politics." By speaking openly about uncertainty, he had "inadvertently broken some code of silence, like the Mafia's *omerta*."

Koonin implies throughout the book that climate scientists have conspired to downplay uncertainty and exaggerate the risk, apparently unaware that increased uncertainty means increased risks. Nowhere does he mention that climate sensitivity is described in the scientific literature by a probability density function that is highly skewed, with a long high-sensitivity tail that we cannot discount with certainty. Risk is the integrated product of probability and consequences. It's hard to argue that the consequences of climate change don't get worse with sensitivity.

If a pilot isn't sure about having enough fuel to get you to your destination, if an astronomer isn't sure that an incoming asteroid will miss Earth, if your doctor isn't sure whether you have a terminal disease, if you're not sure you turned the stove off: in each of these cases, the uncertainty is unsettling. Why does Koonin think that unsettled questions in climate science are any kind of comfort when the consequences of doing nothing can be catastrophic? *Unsettled* should leave serious scientists feeling unsettled. (For more information about logical fallacies used by climate change deniers, I recommend www.crankyuncle.com.) ■

This review appeared originally at Yale Climate Connections, https://yaleclimateconnections.org/2021/05/a-critical-review-of-steven-koonins-unsettled/.

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Repairing the American Mind

I was delighted to read Guy Harrison's article espousing the need for critical thinking education (May/June 2021). On one count, however, he is thankfully wrong. At the college level, said education is not limited to "university philosophy courses." For close to one hundred years, Speech Communication (or Communication Studies) Departments have been teaching courses in critical thinking, argumentation theory, and rhetoric. These same departments are often the sponsors of collegiate forensics teams (a co-curricular activity that is also active at the high school level). By championing critical thinking, advocacy, and public speaking, these departments continue to help develop an educated and deliberative citizenry.

Mark J. Porrovecchio
Associate Prof. of Rhetoric
Director of Forensics
Oregon State University
Corvallis, Oregon

I fully agree with Harrison that having more people using critical thinking is a good thing and that anyone can be taught to think this way—just as people are trained in other skills "like learning a trade." I fear he underestimates the amount of effort it takes to learn critical thinking. Furthermore, he provides no incentive or motivation for people to learn critical thinking.

I would estimate the effort it takes to really apply critical thinking is akin to the effort it took for this average math user to scrape through three or four courses in statistics.

Harrison provides no motivation for people to get into and stick at training in critical thinking. If you stick at training to be a welder for a long enough time, you end up fabricating metal objects. If you stick at critical thinking for long enough, you may think you have a clearer picture of the world, but there are millions of others who will surmise that *you* are a deluded part of the sheeple.

It seems to me that the greatest difficulty in getting people to accept critical thinking—as Harrison delineates it—is that while critical thinking may have demonstrable group benefits, we rarely hear how it can benefit the individual critical thinker. Until we can provide a strong statement of its individual benefits, it will continue to be a hard sell—especially when those individuals already have such strong motivations behind their current beliefs.

James Mica
Endicott, New York

I fear that Guy P. Harrison's advocacy of "critical thinking education" as the best means to advance reason and belief in reality in the United States, while admirable, is nothing more than a forlorn hope. Such an approach might be viable in a nation with a nationally centralized education system, as is the case in other industrialized nations. However, in the United States, with its highly localized education system spread out over thousands of school districts across the length and breadth of the country, many of which are controlled by religious zealots and ultra-conservatives, that would be an impossibility. The last thing the powers that be in all too many parts of the nation want to see is a population that embraces critical thinking and accepts reality! That would include the powers that be on all too many school boards.

Dennis Middlebrooks
Brooklyn, New York

I appreciate Guy Harrison's portrayal of America's cognitive crisis, the need to establish corrective steps to reduce its destructive effects, and his plan to advance measures to correct it. It struck me, however, that a giant gorilla in the room was completely unmentioned. That gorilla is religion and the uncritical indoctrination most religious people's children receive throughout their lives that encourage gullibility. Harrison mentions mass delusions but never once mentions the powerful impact of religious indoctrination. He also discusses the importance of making critical thinking an educational norm and suggests that good thinking alleviates bad thinking. But he never addresses the problem of simultaneously teaching good thinking and bad thinking.

Critical thinking is evidence-based thinking built from substantiated facts. Believing in supernatural phenomena requires an absence of evidence. Because a supernatural realm is not known to exist, it is not supported by any verifiable evidence. Whether you are a scientist or the pope, your awareness is of the *natural* world and nothing beyond. *All supernatural claims are unverified speculations.* Because most American children are indoctrinated to believe in supernatural phenomena as reality, a main purpose of education should be to help children recognize what is supported by evidence, what is falsified by evidence, and what is left uncertain based on current evidence. Education should also help children *unlearn* what is promoted as truth that is not supported by evidence. Religion's unverified speculations should not be protected from this scrutiny any more than that of an unverifiable pseudoscience.

Jeff Holtmeier
Silver Spring, Maryland

Harrison replies to Jeff Holtmeier:

Holtmeier is right, but it was a conscious omission. Religious belief is too entrenched and politically charged to mention in passing in a broad essay and expect believers to keep reading. That's why I wrote two books specifically about it.

Critical thinking has to compete with attractive fantasies that—by intention or passively—interfere with critical thought. One need look no further than our consumer economy and the advertising that supports it. Critical thinking doesn't "move product" the way half-formed half-truths accompanied by a musical background with carefully constructed images do when they elicit particular emotional responses. Today, critical thinking means being constantly aware of thousands of attempts every day to distract us from what? Critical thinking. It's not like we are in a neutral environment where all we need is a little critical thinking when we get the chance. Some people don't have the capacity to maintain the levels of vigilance required to question the sea of misleading information we are bombarded with hour by hour. Also, critical thinking is not nearly as much fun as swallowing the available BS, at least for large parts of the human population.

Another aspect of this is identifying and naming who is lying intentionally to mislead, whether for profit or political advantage. We may assume the backlash against that would be severe. Even in this issue of Skeptical Inquirer, there are some objecting to the politicization of some of the content. Teaching critical thinking as if we live in the rarefied atmosphere of intellectuals and scientists won't cut it. Even scientific journals such as *Scientific American* are realizing that bare bones critical thinking isn't enough if it's not put in context of our political reality.

Leonard Bohlman
Waterloo, Wisconsin

Although I completely agree with the insightful analysis provided in Guy Harrison's article, "How to Repair the American Mind," the odds of his proposed solution being implemented are close to zero.

Harrison asserts that political propaganda and irrational beliefs have reached crisis levels in the United States. His assertion is irrefutable, although the American public never has exhibited a fondness or proclivity for rational thought. To alleviate the crisis, he suggests incorporating the teaching of critical thinking skills into our public-school curricula. Once again, his suggestion is spot on and may indeed be the only possible antidote. There's only one problem: it won't happen.

As Harrison notes, "critical thinking" is viewed by many as an elitist concept. The muddled masses who ascribe to this viewpoint include the same religious fundamentalists, MAGA people, conspiracy theorists, and white supremacists who managed to elect (and nearly re-elect) Donald Trump and his ilk. Today's Republican party would universally oppose the teaching of critical thinking, mainly because such a program would eventually result in most Republican politicians being booted out of office. Most religious institutions would oppose the idea as well, because it would threaten their congregations' beliefs in the fairy tales composing their core narratives.

I'm with you, Mr. Harrison, but your proposal is an impossible dream. We'll never reach herd immunity to America's stupidity pandemic.

Dan Davis
Elk Grove, California

At the beginning of Obama's administration, he turned his education portfolio over to his old friend Arne Duncan, who brought in a consultant, David Coleman, to develop the Common Core State Standards (CCSS). Then–New York State Commissioner of Education David Steiner received a one-time waiver to develop a curriculum that could be used for free by all states in English Language Arts (ELA) and mathematics. After the curriculum and accompanying testing were developed, it was mandated with high stakes in most states. The ELA curriculum was especially poor, because it's hard to teach and test in a multiple-choice format, and it reflected Coleman's often-quirky curriculum ideas. Because of all this, the CCSS curriculum monopolized the school day, particularly in lower-achieving populations. It wasn't about learning but rather test prep. Science and social studies went by the wayside. Richer schools would get higher scores no matter what, so they had more latitude for topics such as, yes, critical thinking.

President Biden isn't mandating testing, but it's still in place in many districts, often with test scores affecting teacher salaries. So don't expect to find room for critical thinking classes in every school, particularly high-poverty ones. In the meantime, a longitudinal report from the National Assessment of Educational Progress was issued, showing the long-term effects of the CCSS. Achievement during those years was lower than if the standards had never been instituted, at a huge financial cost and, more importantly, a huge cost in learning. David Coleman became the president of the College Board, where he developed identically modeled tests for high school equivalency, the SAT, and more. The SAT tests, which can be found online, are now being rejected by many colleges as admission tests because they consider them racist. They're basically parallel to the ones being used in public school classrooms.

Sandra Wilde
Hunter College
City University of New York, retired

Distrust of Science

Peter Lantos does a fine job of enumerating reasons the public doesn't trust science or scientists (May/June 2021), but he ignores the elephant in the room: for decades, a variety of industries from tobacco to fossil fuels have spent billions and billions of dollars in sophisticated campaigns precisely to convince us to *not* trust science or scientists. They create doubt and confusion ("more studies are needed," "scientists say what they need to get their grant money"), and their fake "think tanks" provide alternative realities ("CO_2 comes from volcanoes"). Naomi Oreskes has done a brilliant job in her must-read book *Merchants of Doubt*. A huge part of the reason people don't trust scientists is because of this well-funded decades-long effort to get them to not trust it.

John Mosley
St. George, Utah

Concussion-Like Symptoms

I agree with Benjamin Radford that the conclusions of authors Baloh and Bartholomew put forth in their book *Havana Syndrome* (that the symptoms could be explained as a case of mass hysteria) may or may not be the correct explanation (May/June 2021). However, the quotation on page 59, "In fact, *concussion-like symptoms* have been reported in American soldiers returning home from every major conflict …" is possibly the worst possible and least surprising example to use in support of the authors' conclusions. High explosives can and often do cause "concussion-like symptoms," ranging from head trauma with no visible external injuries to death by concussion caused by the shock waves of an explosion—again often with no apparent external injuries.

The American Academy of Neurology defines *concussion* as a trauma-induced alteration in mental status that may or may not involve loss of consciousness. It would be an enormous unexplainable anomaly if all soldiers returning from active war zones never had concussion-like symptoms. See, for example, "Managing Traumatic Brain Injury Secondary to Explosions" by Burgess et al. 2010 or any of dozens of other papers available on this subject. Perhaps some important context was edited out, but to present the quoted statement as support of mass hysteria in the Havana incident is simply not relevant.

Alan McBrayer
Charlotte, North Carolina

Visiting Aliens?

In response to the book review "UFO Believers" by Terence Hines of a book by Sarah Scoles (May/June 2021): One can easily fall into the "visiting alien" theories, but really?

A species in a far galaxy might decipher that Earth was in turmoil, but after sending ships to check it out, they would discover that Earth was a burnt cinder. Oops, too late, time wins.

A more realistic(?) explanation would follow the ideas presented by films such as *Timescape* (1992, starring Jeff Daniels) and *Thrill Seekers* (1999, starring Martin Sheen) where disaster time-traveling tourists drop in from the future to witness notable events and move on. Except our travelers send back in time a drone with X-century technology for observation while executing radical movements and cloaking technology. That being so, what disaster might they be recording? Climate catastrophe?

Michael Beneke
Kelso, Washington

BMI Index

Regarding the usefulness of BMI as even a marginal indicator of good

health ("Skeptical Inquiree" column, May/June 2021), I should point out that a University of Idaho study found the average height and weight of an NFL linebacker is approximately 6'2" and 245 pounds, which translates to a BMI of 31.5. I can only say that I would not consider myself to be in better shape than these, according to the BMI index, obese people.

I have personal experience of numerous powerlifting competitions in which competitors whose BMI would put them in the morbidly obese category would have no trouble simultaneously lifting the author of the article and whoever proofed it. Spare a thought also for all those poor morbidly obese winners of bodybuilding meets.

Alan Dean Foster
Prescott, Arizona

Benjamin Radford replies:

I'm honored that Foster read my column and replied, but there is no contradiction; my column specifically states that BMI is not *a good indicator of health for athletes—just as he says!*

Ambrose Bierce

As a lifelong fan of Ambrose Bierce, I was pleased to see Joe Nickell's column "Incredible Vanishings" (March/April 2021). Alas, Nickell relies on hearsay and speculation but lacks a smoking gun from Bierce. I still like the Mexico story, but it seems unlikely it will be proven.

What Nickell neglected are some interesting developments in the Bierce saga, including the novel *The Old Gringo* (1985) by the Mexican novelist Carlos Fuentes—a surreal account of Bierce's time in Mexico. Then came the 1989 movie *Old Gringo* starring Gregory Peck as Bierce and Jane Fonda as the American governess who became his friend. The movie was a flop and adds little to the story.

Bierce also wrote Civil War stories that are still with us, including the oft-reprinted "An Occurrence at Owl Creek Bridge" and the fantasy "An Inhabitant of Carcosa," which is still popular with the Lovecraft crowd.

As a longtime fan of Charles Fort's brand of humor, I was pleased to see Nickell touched base there in passing with his mention of Canadian businessman Ambrose Small. Fort's unanswerable question is, "Was somebody collecting Ambroses?"

Neal Wilgus
Corrales, New Mexico

Joe Nickell replies:
I'm not sure whose article Mr. Wilgus read, but mine did not contain a reference to "Canadian businessman Ambrose Small." I wonder what ambrosia they're sipping there in Corrales.

I also didn't rely on "hearsay and speculation." Bierce wrote a powerful essay advocating suicide and indicated his personal intent in final letters to friends (e.g., "My work is finished and so am I"). These add to what is known in investigating suicides as a "psychological autopsy." So does the fact that Bierce permanently closed out his affairs. Corroboratively, we have testimony of Bierce's close friend Walter Neal, a thoroughly reputable man, whom Bierce showed a photo of his intended resting place in the gorge of the Colorado and described a "German revolver" he had for the purpose.

If Wilgus needs more of a "smoking gun," it was the pen with which Bierce wrote the stunning letter to his daughter in 1913, giving up his cemetery plot. It ends with the statement that he did "not wish to lie there. That matter is all arranged and you will not be bothered about the mortal part of [signed] Your Daddy." This gives the lie to Bierce's whole Mexico misdirection because, if anything happened to him there, his body might've been shipped home—surely no way to disappear! The U.S. government could not confirm that the author (who also wrote a "Mysterious Disappearances" trilogy) had crossed into Mexico.

For Mr. Wilgus and others who wished to read more, there is my book, Ambrose Bierce Is Missing *(1992). Also Bierce biographer Roy Morris Jr. has developed my solution in his* Ambrose Bierce: Alone in Bad Company *(1995).*

Science, Logic, and Evolution

Charles Hawkins (Letters, May/June 2021) raises some points that merit further discussion, such as my claim that the theory of evolution is provably correct. Statements can be of two kinds: universal and existential. (The negation of a universal statement is an existential statement, and vice versa.) Most scientific theories are universal statements: they are claims that are purported to be valid throughout the entire universe. These include theories in physics, chemistry, and many other disciplines, which we use because they work and, more particularly, have never been shown to be wrong. (See Popper, *Conjectures and Refutations*.) In other words, they are refutable in principle but haven't been refuted.

But the theory of evolution is different; it consists of two existential statements: 1) Heritable mutations occur with every reproduction. 2) Some mutations are favorable for survival and reproduction. Both of these statements are demonstrably true, and because the theory of evolution relies on these two premises and on nothing else, it is necessarily true also. For details, see my book *Knowledge: What Can We Know, and How Can We Know That We Know It?* available on Amazon.

Also, Hawkins is correct that the Bible is many things—but factual is not one of them. There are errors of fact, logic, and consistency running into the thousands. (See McKinzey, *Biblical Errancy: A Reference Guide*.)

Robert A. Saunders
Rohnert Park California

Science Can Guide

I enjoyed the many interesting and thought-provoking points offered in the exchange between Charles H. Jones and Massimo Pigliucci ("Is There a Philosophical Magisterium?" March/April 2021). In the most coarse-grained synopsis, Jones argues that if something is real—and all that affects us is real—it is testable by science, whereas Pigliucci counters that certain questions cannot be answered with science. He uses abortion as an example.

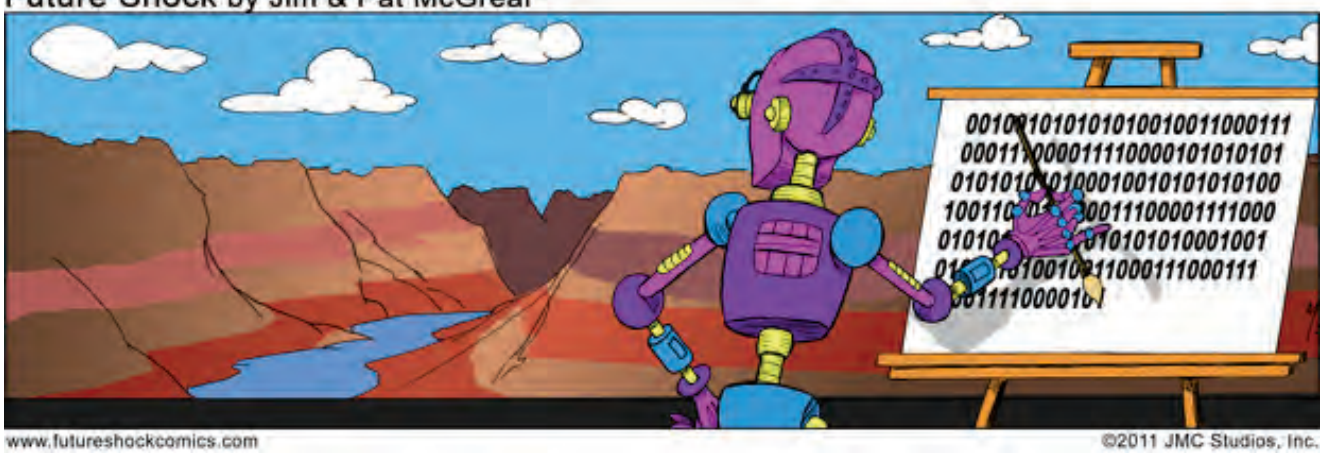
With abortion, Pigliucci explains, science can determine the approximate age of a fetus when it begins to feel pain, but science will not lead one to conclude that abortion should not be permissible when the fetus experiences pain. The gist of his argument is that the permissibility of abortion can be arrived at from argumentation based on a starting criterion that is not grounded in empirical facts.

I would argue that science can inform the whole process. Starting criteria based *solely* on religious dogma or political ideology can be eliminated as irrelevant. Then, the nuanced understanding provided by science can guide the formulation of starting criteria.

The strength of science is not in its ability to answer questions but in its power to provide understanding and context that can be applied to making informed decisions. Pigliucci is right that starting criteria cannot be determined from science alone, but a productive process requires that science play a far greater role than he implies.

Mark G. Kuzyk
Regents Professor of Physics
Washington State University
Pullman, Washington

Future Shock by Jim & Pat McGreal



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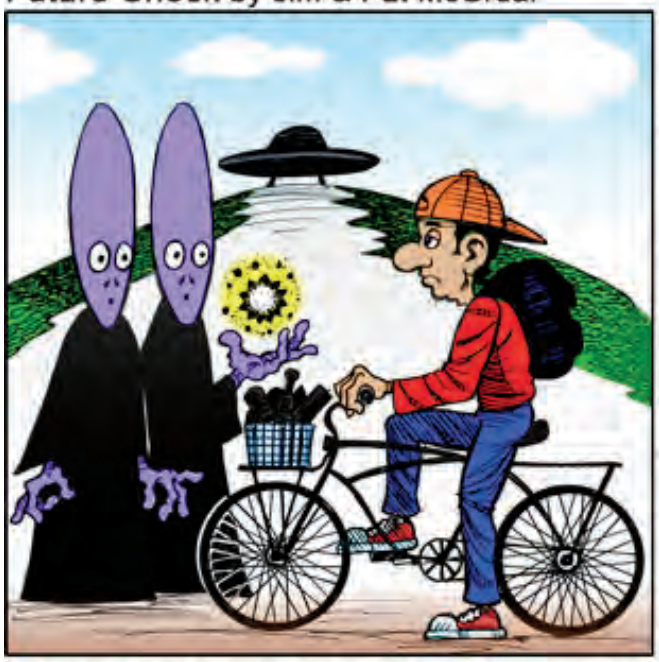

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Skeptical Inquirer's

Tips for Keeping UFO Reporting Grounded In Reality

"Unidentified" Does Not Equal "Aliens"

Sources often conflate sightings of something in the sky with extraterrestrials. Most UFOs become IFOs (identified flying objects).

UFO Enthusiasts Have Motivations

There are always going to be officials among the sprawling defense agencies and their contractors who have to take reports of UFOs seriously, as well as politicians and public figures for whom UFO controversies serve their particular ends.

Talk to the Actual Experts

When possible, it's best to seek out independent, knowledgeable scientific and technical sources, not just enthusiasts and believers. CSI can connect journalists to these experts.

Just Because Alien Life Is Possible, It Doesn't Mean It's Here

The fact that astronomers believe on a statistical basis that life may exist elsewhere in the universe does not mean that they think that aliens may have arrived or that they ever will.

We Can't Identify Everything

Not every question gets answered. There are always going to be some unresolved sightings, often where very little is known or recorded.

Anecdotes Are Not Data

Statements such as "It flew away at speeds unimaginable" or "turned in a way impossible for any aircraft today" are not reliable.

Remember Occam's Razor

Even highly advanced imaging equipment is susceptible to errors and human misinterpretations. Plausible, terrestrial explanations have been advanced for all the U.S. Navy videos that have caused so much fuss.

This is a highly condensed version of the CSI Statement "Tips for Media in Covering UFO/UAP Claims." The full version appears on page 43 of this issue.